

**INTERPERSONAL TRAITS
AND THE
TECHNOLOGY ACCEPTANCE MODEL:
APPLYING THE INTERPERSONAL CIRCUMPLEX MODEL
AS A NOMOLOGICAL NET FOR UNDERSTANDING
USER PERCEPTIONS WITHIN HUMAN-TO-COMPUTER INTERACTION**

A Dissertation

by

HOUGHTON GREGORY BROWN

Submitted to the Office of Graduate Studies of
Texas A&M University
in partial fulfillment of the requirements for the degree of

DOCTOR OF PHILOSOPHY

August 2008

Major Subject: Information and Operations Management

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Approved by:

Co-Chairs of Committee,	Marshall Scott Poole Evan E. Anderson
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ABSTRACT

Interpersonal Traits and the Technology Acceptance Model:
Applying the Interpersonal Circumplex Model as a Nomological Net for Understanding
User Perceptions within Human-to-Computer Interaction. (August 2008)

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This study examines the effects that individual personality traits have on technology acceptance. Previous research on technology acceptance focuses primarily on exogenous variables such as trustor's perceptions, attitudes, computer anxiety, positive or negative affect, age, and experience. This research seeks to improve our understanding of technology acceptance by examining user interpersonal traits as the underpinnings of user perceptions of technology and disposition to trust. A general theory of personality, the interpersonal circumplex (IPC) model, is used here as a framework to explain IT-users' computer self-efficacy, computer anxiety, and perceptions about- and trust in technology. The interpersonal circumplex model is well established and provides a strong foundation for understanding interaction styles and interpersonal trust. Based on the interpersonal circumplex model, I develop predictions about how various personality types will interact with technology acceptance model (TAM) related variables: that is, I predict how individuals with different interpersonal traits will rate the following: their computer self-efficacy, computer anxiety, and perceptions of an information system's performance; the system's trustworthiness, ease of use, usefulness; as well as the user's behavioral intention to use the system in the future. In general, I hypothesize that a computer user's blend of the primary interpersonal dimensions of Control and Affiliation influences his or her responses to computer usage related questions. In this study, student-participants completed an on-line assessment of their interpersonal dispositions, using the Circumplex

Scales of Interpersonal Values (CSIV; Locke, 2000); subsequently the student-participants reported their perceptions of- and trust in a computer-based learning system that they used as part of their class. In particular, this research suggests that the Communality (Affiliation) dimension of personality, as measured by the CSIV, indicates particular and significant correlations to user's computer anxiety, perceived system performance, perceived usefulness (of the technology), and behavioral intent to use (IT) in the future. The Interpersonal Circumplex demonstrates improved acuity in detecting personality differences that may impact the way users respond to, perceive, and evaluate technology. As a new tool for information systems research, the IPC shows potential to provide further insight into IS theory by building a bridge between interpersonal theory and technology acceptance models.

DEDICATION

To my parents,
brothers, sister,
and
my inimitable
Godchild,
Clarice

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As much as I am grateful for having had Dr. Marshall Scott Poole as my Graduate advisor and dissertation committee co-chair, I am especially appreciative for having had Dr. Poole frequently as my professor. If it can be said that a professor is a *tour de force* in the classroom, then Professor Poole deserves such recognition for his lectures, breadth of knowledge, impressive historical references, as well as his assignments. Dr. Poole is also a well of patience, kindness, and service. Dr. Poole, to you I am deeply indebted.

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Much like being exiled, graduate student life can be a meager, socially sparse, and sometimes paranoid existence. I was pleased to have others to share it with: my officemates Hasan Mohammed and Liqiong “Joan” Deng; and fellow classmates Jun Sun, Uzma Raja, Haiyan Fan, Subrata Chakrabarty, and Jeremy Brann among others. Together we made the challenges bearable and achievable. On behalf of those who followed your path, your advice, and your notes, I would especially like to thank Hope Koch, Diane Hall, and Maggie Guo. Similarly, the administrators in our department seemed as much a supportive family as they did staff. Thank you all, especially Bettie P. and Donna S..

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And to my family, *who among us saw this coming?* Regardless, your love and support throughout my odyssey helped make this pinnacle possible. Thank you.

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CHAPTER I

INTRODUCTION

1.1 PROBLEM STATEMENT

This research examines the role that interpersonal traits exert in the evaluation of Information Technology; more specifically, it examines the role that one's interpersonal traits may exert in regards to the evaluations of a computer-based learning technology, also known as CBL. This research uses the framework of interpersonal theory – specifically interpersonal circumplex (IPC) – as a means of differentiating users on the primary personality dimensions of Agency and Communion (a.k.a. Power/Control and Affiliation/Friendliness). The overarching inquiry is this: *as differentiated by the IPC*, do interpersonal traits play a significant role in such subjective factors as “perception” and other exogenous variables of the TAM, such as computer anxiety and computer self-efficacy?

Specifically, the objectives of this research are the following:

- a) To assess the impacts that individual interpersonal traits may have on user perceptions of technology.
- b) To assess the differences in individual ratings of perceived usefulness of certain technology based on users' interpersonal traits.
- c) To assess the differences in individual ratings of perceived ease of use of certain technology based on the users' interpersonal traits.
- d) To assess the differences in individual ratings of satisfaction with certain technology based on the users' interpersonal traits.
- e) To assess the differences in user computer self-efficacy with technology based on the user's interpersonal traits.
- f) To assess the differences in user computer anxiety with technology based on the users' interpersonal traits.
- g) To assess the differences in user computer anxiety with certain technology based on the user's interpersonal traits.
- h) To test for differences in user trust with certain technology based on the users' interpersonal traits.

This chapter is organized as follows: section 1.2 Goals of the Study, introduces the scope of this study and the Interpersonal Circumplex Model as the primary theoretical framework for explicating TAM variables, along with three supporting personality models. Section 1.3 highlights calls for research, pertaining to individual user differences as they may relate to TAM-related variables: perceived usefulness, perceived ease of use, computer self-efficacy, computer anxiety, etc.

Chapter II, Theoretical Framework and Hypotheses, discusses the Interpersonal Circumplex (IPC) as the primary theoretical framework for the study, elaborating on its history and development, and its principles and applications. Following the discussion of the IPC, three additional personality models are discussed that complement the IPC and support the theoretical foundations for the subsequent hypotheses. These three additional personality models are the Mood Model (of Affectivity), the Five Factor Model (FFM), and Holland's RIASEC Model (of vocational personality types or of vocational interests). Following the introduction of each model and its salient research to information systems, it will be shown how each model maps to the prior model(s). Lastly, in Chapter II, I return to the TAM and related variables and build integrative justifications for the related hypotheses.

1.2 GOALS OF THE STUDY

This research proposes relationships between interpersonal theory and variables related to user technology acceptance. The Interpersonal Circumplex (IPC) will serve as the primary interpersonal lens through which I view users' perceptions of technology and base the hypotheses. The following additional personality theories are enlisted to support the theoretical construct and hypotheses building: Affectivity (mood model), Five Factor Model (FFM), and Holland's RIASEC (model of vocational interests). The IPC is a psychological scale that more thoroughly differentiates individuals (here, information technology (IT) users) than has been previously used in MIS research.¹ Affect theory and FFM have been applied separately to MIS research; the research results, however, have been either insignificant, mixed, or limited (Korukonda 2007; Thatcher et al. 2002).

¹ Other than the research of this student, Houghton G. Brown, and his dissertation supervisor, Dr. M. Scott Poole.

While the theories behind their related hypotheses were justified, possibly the broadness of the Affect and FFM scales and/or their limited personality type distinctions may have contributed to the unexpected or weaker than expected results. Mood Modeling (e.g. Affect) yields no more than two to four mood types. The FFM yields five. The IPC can partition users up to as many as eight² different interpersonal trait-types. It is this granularity and its robust theory that suggests that the IPC will provide the most potential for providing a nomological net for extending personality theory in MIS research as it relates to explaining IT user differences.

As a widely accepted theory used to explain individuals' behavioral intent to use technology, the TAM, along with some of its related extensions, provides useful focal points for applying the IPC. The TAM and related TAM-extensions include 'soft' variables or soft facets within the variable that draw them into the vagaries of subjectivity. At the heart of our attention here are concepts such as perceptions and dispositions: *perceptions* of ease of use or usefulness; *perceptions* of one's own computer self-efficacy; as well, there are *dispositions* to computer anxiety; and *disposition* to trust. How might these variables be explained? If these constructs are depicted at the beginning of TAM models they represent end-of-the-theory exogenous variables, as yet explicated; if the concepts reside in the middle, we accept/reify them as enduring 'black-box' constructs, inexplicable though they be. This research aims to explain such exogenous and black box variables through prism of the IPC. The next section highlights the calls for research in this area.

² The original IPC makes 16 separate interpersonal trait distinctions. We will be using the revised 8-trait IPC (Wiggins, Trapnell, Phillips, 1988), which pairs the 16 traits into 8 separate but combined traits. (What was originally, respectively Assured, Dominant, Arrogant, and Calculating, becomes Assured/Dominant and Arrogant/Calculating.)

1.3 CALLS FOR RESEARCH ON ANTECEDENTS TO USER'S PERCEPTIONS

This section briefly previews certain TAM-related variables to be considered in this research. The TAM-related variables highlighted in this section are those for which I have identified relevant 'calls for research.' The TAM-related variables that are salient to this research are those to which I can reasonably hypothesize relationships to interpersonal theory *vis-à-vis* the Interpersonal Circumplex (IPC): namely, variables that lend themselves to the subjectivity of user perceptions and dispositions. Following this brief review of the TAM, I will present 'calls for research' on the following: Perceived Ease of USE (PEU), Computer Self-Efficacy (CSE), Computer Anxiety (CA), satisfaction, and trust.

1.3.1 The Technology Acceptance Model (TAM)

The Technology Acceptance Model (TAM), developed by Davis (Davis 1989), helps explain user acceptance (Adams et al. 1992; Mathieson 1991; Venkatesh 2000; Venkatesh et al. 1996) and, therefore, has become the core template for much technology acceptance theory. According to the Technology Acceptance Model the primary factors of Perceived Usefulness (U) and Perceived Ease of Use (PEU) drive the user's Attitude to Using (ATT) and consequently, his/her Behavioral Intention (BI) to use the technology. The constructs PU and PEU explain system characteristics; they do not, Venkatesh and Davis (Venkatesh et al. 1996) note, explain user acceptance beyond these perceptions; thus, "it is important to understand the antecedents of the key TAM constructs" (p. 473).

1.3.2 Perceived Ease of Use (PEU)

About *perceived ease of use*, Venkatesh (Venkatesh 2000) summarizes: "The findings suggest that initial drivers of system specific perceived ease of use are largely *individual difference* [italics added] variables and situational characteristics, whose effects become stronger with experience" (p. 357). These "individual difference variables" that influence such evaluations as *perceived ease of use* are what I seek to

identify. That individual differences exert a stronger effect with experience makes their identification all that more important to TAM research.

1.3.3 Computer Self-efficacy (CSE)

After having reviewed twenty years of research on social psychology and self-efficacy, Compeau and Higgins (Compeau et al. 1995) conclude that “all of the studies argue the need for further research to explore fully the role of self-efficacy in computing behavior” (p. 190). In their *Framework for the Construction of CSE Measuring Instruments*, Marakas, Yi, and Johnson (Marakas et al. 1998) advise that we should understand CSE from both an antecedent and consequent perspective; more specifically stating that we should understand CSE through “improved measurement of the psychometric properties of the construct” (p. 127). The highly related construct self-efficacy has been found to exert significant influence – even after the key determinant of past-performance has been partialled out (Locke et al. 1984). Thus, as Bandura (Bandura 1977) points out, the influence of self-efficacy is not simply an issue of self-efficacy itself but of one’s *perception* of their own self-efficacy: “The strength of people’s convictions in their own effectiveness ... the stronger the perceived self-efficacy, the more active the efforts” (p.194). Further, this conviction or strength of perception may be affected by one’s emotions and anxiety. Emotional, stress, and anxiety responses (Bandura 1977) also effect self-efficacy expectations, thus, in turn, effecting performance (Bandura et al. 1977).

1.3.4 Computer Anxiety (CA)

A 1994 review of the literature on computer anxiety found that the research on CA and traits are suggestive of correlations but limited and at times inconsistent (Maurer 1994). Vocational typing (per Holland’s RIASEC) demonstrated correlations to CA (Bellando et al. 1985). Research on locus of control and computer anxiety had inconsistent results (Griswold 1985; Hawk 1989): only Griswold found differences between ‘internals’ and ‘externals’ with respect to CA. Maurer (Maurer 1994) concluded

that we do not know what we do not know. Henderson, Deane, Barrelle, and Mahar (Henderson et al. 1995) observe that “it has not yet been established whether it is computer anxiety or a general disposition to respond anxiously to a variety of stressors, which determines these problems” (p. 183). Smith and Caputi (Smith et al. 2001) echo the observation, noting that the intensity of subjective computer anxiety varies as a function of “the individual’s interpretation of the situation as personally threatening,” which depends, in part, on individual factors (p. 266). While the research on traits and computer anxiety is mixed (Cambre et al. 1985; Kernan et al. 1990; McPherson 1998), research exists that correlates computer anxiety to the following: individual attitudes (Chen et al. 1992; Farina et al. 1991), vocations (Bellando et al. 1985), self-efficacy and computer self-efficacy (Compeau et al. 1995; Deane et al. 1995; Kinzie et al. 1994), as well as traits (*vis-à-vis* the NEO-Five Factor Inventory (Anthony et al. 2000), and trait anxiety (Farina et al. 1991). There still exists, however, calls for more research (Maurer 1994) and a need for specification of the underlying nomological net (McPherson 1998; Thatcher et al. 2002).

1.3.5 Satisfaction, Behavioral Beliefs, and Attitudes

Wixom and Todd (Wixom et al. 2005) importantly note that “in the user satisfaction literature, the mediating behavioral beliefs and attitudes are absent, and inattention to this conceptual gap explains the equivocal relationship between system satisfaction and system usage” (p. 89). It is the proposition of Wixom and Todd that technology acceptance literature and user satisfaction literature “represent complementary steps in the cause chain from key characteristics of system design, to beliefs and expectations about outcomes that ultimately determine usage” (p. 91). Wixom and Todd conclude that there is a need to distinguish between “object-based beliefs and attitudes (system and information quality, system and information satisfaction) and behavior-based beliefs and attitudes (ease of use and usefulness, attitude)” (p. 98). Wixom and Todd suggest that future research include examining the “mediating factors related to behavioral beliefs and attitudes, such as ease of use, usefulness, attitude toward use, and behavioral intention as specified in TAM” (p. 99). Where Wixom and Todd

suggest investigating “the effects of the IT artifact, itself, as the antecedent to ease of use, usefulness, and related factors,” this research proposes to take a one step further back and investigate the *effects of the USER himself* and his traits as antecedents to perceptions about Ease of Use (EOU), Usefulness (U), Attitudes (ATT), and related factors.

1.3.6 Trust and Information Technology

We have seen above that the TAM has been extended with such variables as computer self-efficacy, computer anxiety, perceptions of control, and satisfaction. Others have identified another construct as being a constraint or facilitator of IS usage – and that is the issue of *trust*. Pavlou (Pavlou 2003) proposes integrating trust and *perceived* risk into the TAM model. Pavlou finds that a consumer’s *trust* in an e-commerce site affects his/her *Perceived* Risk, *Perceived* Usefulness, and his/her *Perceived* Ease of Use, in addition to influencing his/her Intention to Transact commerce. Trust theorists in the MIS field have cited the need for a greater understanding of the precursors to trust. McKnight and Chervany (McKnight et al. 1998) argue that in order to better understand IT-enabled interactions, it is important to understand the characteristics of the actors’ who participate in them; it is through their character that trust proceeds; and, these theorists advance the notion of “disposition to trust.” *Are there precursors to such constructs as disposition to trust?* Jarvenpaa, Knoll, and Leidner (Jarvenpaa et al. 1998) suggest that “future research should study the relationship between trusting behavior and other antecedents to trust” (p. 59).

Trust is the intangible medium upon which commerce and decisions ride along the Internet. As a result, trust has been greatly researched within management information systems (MIS): e-commerce (Ba 2002; Bhattacharjee 2002) and consumer acceptance (Pavlou 2003), computer-mediated collaboration (Beranek 2000; Jarvenpaa et al. 1999; Jarvenpaa et al. 2004), e-learning (Spencer 2001), and telemedicine (Paul 2000). While trust is patently important in transactions and human affairs, it is, perhaps, even more so when interactions are embedded in the virtual realm. Understanding the role of trust will enable stakeholders in information systems and technology to realize more success from these investments.

Much MIS research on trust and technology is concerned with the social context, processes and outcomes of interacting, as well as the institutional safeguards related to trust. Under these perspectives, trust is seen as a function of the immediate context: what are the institutional safeguards, the system safeguards, the corporate culture, the relationships (Govier 1997), the risk/reward ratio and privacy safeguards? What such research neglects is the ‘black box’ of interpersonal predilections and determinants of trust; likewise, such research does not fully recognize the interpersonal dynamics within users that constrain or facilitate trust. In an effort to address these questions, this study proposes stepping back in the causal chain to understanding the individual and his or her personality traits that may make him or her disposed to trusting or distrusting.

This study attempts to answer Lee, Barua, and Whinston’s (Lee et al. 1997) “call for a richer theoretical foundation for developing causal models, which will provide a better justification of ‘why’ and ‘when’ relationships exist rather than ‘what’ relationships exist” (p. 111). The approach that I take here responds to the call to understand the *why* relationship within causal modeling, rather than simply the *what* relationships. Therefore, understanding the interpersonal factors – of *disposition to trust*, as well as the personality traits that may indicate a predilection to technology adoption – may provide insights into the “softer side” of technology adoption.

1.3.7 Focus and Integrate

In reviewing the phenomena studied by IS scholars and the “core properties of the IS discipline,” Benbasat and Zmud (Benbasat et al. 2003) include the study of “human behaviors reflected within, and induced through both the (1) planning, designing, constructing, and implementing and (2) direct and indirect usage of these artifacts” (p. 186). In their critique of IS research, Benbasat and Zmud (Benbasat et al. 2003) advocate that IS research remain focused within their delineation of the IS framework; but at the same time, however, they acknowledge the appropriateness of integrating “models with those already developed in non-IS fields to inform the IS audience of the wider context enveloping a phenomenon” (p. 192). As an example, the authors specifically suggest the importance of understanding trust *vis-à-vis* e-commerce. While my research adopts a

well-established model from interpersonal psychology, the Interpersonal Circumplex (IPC), it does so with the intent of enhancing our understanding of the essential “intermediate variables, such as ease-of-use, usefulness, (and) behavioral intentions.” By differentiating users along two primary dimensions – Agency and Communion³ – and into as many as eight different interpersonal traits, the IPC enables very focused predictions about user trait influences on TAM variables.

While seeming to criticize much of the current IT research as being too distant from the IT artifact, if not minimally focused on it, Orlikowski and Iacono (Orlikowski et al. 2001) also recognize this diversity as an opportunity: “We believe that moving beyond received disciplinary notions towards broader and deeper interdisciplinary conceptualizations of IT artifacts is not only possible, but essential if the IS field is to make important contributions” (p. 130). Ideally, this research will provide a theoretical foundation – as Orlikowski and Iacono (Orlikowski et al. 2001) prescribe – that includes “the insights from more recent social ... theories that account for how people understand, adopt, use, and change their artifacts in complex and dynamic social contexts” (p. 129).

This section identified key variables that have proposed as extensions to the TAM; more specifically, they have demonstrated a mediating affect on perceived ease of use. Further highlighted, were other theorists’ calls for more research to clarify, extend, or unify research in these areas.

1.4 IMPORTANCE OF STUDY

Exploring a reductionist view – that is, discovering the exogenous variables – is advocated by Lee, Barua, and Whinston (Lee et al. 1997) in order to build richer causal models. My rationale for examining user traits and inherent dispositions is captured by Lee et al. (Lee et al. 1997): “In many MIS problems, measuring the perception bias may be an important step in better understanding the phenomenon of interest.... Detecting systematic perception bias may enrich theory, since it may indicate the existence of more complex mechanisms governing the problem of interest” (p. 111). Cooper and Zmud (Cooper et al. 1990) make a call for more thoroughly examining “the dynamics of the

³ “Agency and Communion” are the most recent appellations for the dimensions of Control/Power and Friendliness/Affiliation. Please know that these synonyms will also be used in this dissertation.

individual, organizational, and technological adaptations across the implementation stages” (p. 137). Citing Cooper (1988), Lee et al. (Lee et al. 1997) reiterate this point within the first of their three critical steps in the discovery process, “we call for a richer theoretical foundation for developing causal models, which will provide a better justification of ‘why’ and ‘when’ relationships exist rather than ‘what’ relationships exist” (p. 111). The approach that I take here responds to the call to understand the *why* relationship within causal modeling, rather than simply the *what are* relationships.

1.5 OVERVIEW OF THIS STUDY

This study will examine the relationships between TAM-related variables and personality traits as represented by the Interpersonal Circumplex (IPC). In this study, college students enrolled in introductory level information technology classes (a.k.a. introductory computer classes) are surveyed (online) as to their personality traits and general dispositions to technology. After completing coursework involving learning Excel and Access on a computer-based learning technology (CBL), students completed online surveys, regarding their feelings about having used the technology. More specifically, the post-CBL questions address the following variables, concerning their experience with the CBL system: computer self-efficacy, computer anxiety, perceived system performance, trust in the technology, as well as perceived ease of use, perceived usefulness, and behavioral intention to use.

In Chapter II, I introduce the Interpersonal Circumplex (IPC), a psychological trait scale that I believe will help provide a unifying nomological net for the discussion of TAM-related variables, such as computer self-efficacy, computer anxiety, and trust. Supporting the rationales for the subsequent hypotheses, I will follow the presentation of the IPC with a discussion of three additional personality models and their pertinent research. How these three models map to the IPC provides rationales for the subsequent hypotheses.

CHAPTER II

THEORETICAL FRAMEWORK

AND

HYPOTHESES

This chapter is organized as follows: *Section 2.1* elaborates on the Interpersonal Circumplex (IPC), providing an overview, history, and explanation of its use. The next three sections present supporting and/or complementary personality models that map to the IPC: *Section 2.2* presents the Mood Model of Affectivity and its relation to the IPC; *Section 2.3* presents the Five Factor Model (FFM) and its relations to the Mood Model and the IPC; *Section 2.4* presents Holland's RIASEC preferred occupations scale and its relationships to the FFM and the IPC. Drawing from the IT-pertinent research using models and integrating their mappings to the IPC, hypotheses are developed the following section. *Section 2.5* presents the issue of Locus of Control and Agency as it relates to the FFM and the IPC personality scales. *Section 2.6* outlines the Technology Acceptance Model (TAM), the TAM-related variables, and develops hypotheses, relating the properties of the IPC to TAM-related variables.

The purposes of this chapter are as follows. The initial sections on the IPC, the Mood Model, the FFM, and the RIASEC are intended to familiarize you with the psychological frameworks from which I draw. Ultimately, the presiding framework of this study is the IPC; however, supporting some of the hypotheses' rationales are findings from research on the other psychological frameworks; therefore, knowing these frameworks and how they map to the IPC are important context. Another purpose of this chapter is to provide you with some perspective on how I envision the manner by which personality types⁴ may correspond to the users' reactions towards technology, and, in turn, correspond to the users' evaluations of and acceptance of the technology. Therefore, for this project, student-participants – who used a commercially available computer-based learning software (CBL), as required for completion of class assignments over the course of the semester – completed the IPC scale after responding to questions pertaining

⁴ *Personality types* as differentiated into eight traits by the IPC.

to their CBL experience. Anticipating that no two people will have the same perception of or opinion on a matter is considered common sense and prepares a researcher for different responses. Having insight as to why two people may have different perceptions on a matter, prepares the researcher for better understanding and interpretation of those differing responses.

2.1 THE INTERPERSONAL CIRCUMPLEX MODEL (IPC), PERCEPTIONS, TRUST, AND COMPUTER MEDIATED LEARNING

2.1.1 IPC Overview

The Interpersonal Circle or Interpersonal Circumplex Model is a psychological classification system that represents individuals' personality traits (and trait behaviors) related to interpersonal relationships on a circular plane. The two-dimensional circle is bisected and quartered by the orthogonal personality dimensions of Agency (Control) and Communion (Affiliation). The Control axis runs vertically and is identified by polar values of Dominant and Submissive (North and South respectively). The Affiliation axis is horizontal and its polar values (from East to West) are Hostile and Friendly.

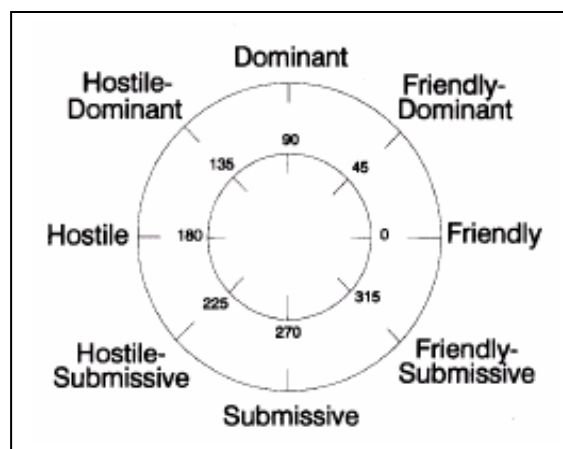


Figure 1. General Framework of the Interpersonal Circumplex

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Thus, the four quarters of the circumplex, counter-clockwise, may be referred to as Hostile-Dominant, Hostile-Submissive, Friendly-Submissive, and Friendly-Dominant (Carson 1969; Kiesler 1983; Orford 1986). (See Figure 1.)

2.1.2 Applications

Interpersonal Circumplex theorists present the IPC as a means of explaining and predicting interpersonal transactions (Horowitz et al. 1991; Moskowitz 1988; Moskowitz 1994), interpersonal problems (Alden et al. 1990; Gurtman 1992b; Horowitz et al. 1991; Horowitz et al. 1988; Tracey et al. 1996), patient-counselor or patient-doctor relationships (Kiesler et al. 2003), family and marital dynamics (Campbell 1990; Olson 1999), counseling predicting interpersonal trust (Gains Jr. et al. 1997; Gurtman 1992b), and predicting complementarity of dyads (Bluhm et al. 1990; Carson 1969; Dryer et al. 1997; Leary 1957; Markey et al. 2003; Strong et al. 1988a; Tracey 1994; Tracey et al. 2001; Wagner et al. 1995). More salient to this research, the IPC has been used to predict vocational interest and job satisfaction (Broughton et al. 1991; Schneider et al. 1996).

2.1.3 Interpersonal Circumplex History and Development⁵

Those individual differences that are most salient and socially relevant in people's lives will eventually become encoded into their language; the more important such a difference, the more likely is to become expressed as a single word. – summary of the Lexical Approach (John et al. 1988)

The original Interpersonal Circumplex (IPC) is generally attributed to Timothy Leary (Leary 1957) and his associates from the Kaiser Foundation Group (Freedman et al. 1951). (See Appendix for Figure A1, Leary's 1957 Interpersonal Behavior Circle.) Leary and associates situated trait descriptive terms equidistant around a circle (such as hours on a clock), depending on their blend of Control (Agency) and Love (Communal). (These two orthogonal dimensions, Agency and Communal, align North to South and East to West, respectively.) The genesis of the interpersonal circumplex (IPC), however,

⁵ The material for this history section draws from the following sources: Digman (1990), Wiggins (1996, 2000), John, Angleitner, and Ostendorf (1988), and Hogan (1982).

may be traced back to Sir Francis Galton (1822-1911), an English scientist and writer who is credited for scanning a dictionary and assembling approximately 1000 personality descriptors (Galton 1884). In what became known as the Lexical Hypothesis, Galton's intention was to produce a taxonomy of personality traits. Though Galton's work yielded no immediate, cogent studies, his Lexical Hypothesis appeared to have rippled slowly across the English Channel, where German philosopher and psychologist Ludwig Klages (1872-1956) advocated the systematic study German language for purposes of comprehending personality (Klages 1926). Klage estimated that there were possibly 4,000 German words that would characterize 'inner states.' Franziska Baumgarten⁶ (1883-1970) accepted Klage's challenge and attempted to systematically categorize German personality terms (Baumgarten 1933). Using dictionaries and literature from German, characterologists Baumgarten qualified 941 trait-descriptive adjectives and 688 nouns (John et al. 1988). Like the Englishman Galton (Galton 1884) before them, the lexical efforts of Klage (Klages 1926) and Baumgarten (Baumgarten 1933) languished in their native country. Interest in the Lexical Hypothesis, however, continued to ripple.

First from England to Germany, the lexical approach to understanding personality then made its way to the United States. Allport and Odbert (Allport et al. 1936) caught the little lexical⁷ wave and began their own examination of the English language. Employing a Webster's *New International Dictionary* (1925), Allport and Odbert examined about 55,000 separate terms, parsing them down to 18,000 based on their capacity "to distinguish the behavior of one human being from another" (p. 24). Exercising an iterative selection process (see John et al. 1988 for more detail), Allport and Odbert distilled their list from 18,000 terms to 300 representatively selective terms. Back in England, Raymond Cattell commenced a systematic lexical research stream (1943, 1946, 1947, 1948 cited by John et al. 1988) that resulted in a taxonomy of traits for a 16 Personality Factor model (Cattell et al. 1970). Cattell's studies were criticized for their complexity (Banks 1948) and their inability to be replicated (Digman 1990; John et al. 1988).

⁶ Franziska Baumgarten, although a speaker of German, was born in Lodz, Poland (1882, this was part of Russia) and partook in university studies in Krakow, Paris, Berlin, and Zurich.

⁷ "lexical"- others refer to it as natural language analysis

Employing “psychological synonymy” and, as yet termed, “multitrait-multimethod” the Kaiser Foundation Group distilled several hundred personality terms to construct a rating scale that yielded a relatively symmetrical, 16 category interpersonal circumplex model (Leary 1957). Timothy Leary (Leary 1957) and his associates from The Kaiser Foundation Group operationalized and systematized the notions of interpersonal theory around two primary dimensions (which Leary represented as Dominance vs. Submission and Hate vs. Love) *vis-à-vis* a circle or “circumplex.” Leary’s initial IPC (Leary 1957) engendered similar IPC models and scales from interpersonal theorists over the subsequent decades; Wiggins (Wiggins 1982) identified 20 independently constructed circumplex models within decades of the original’s introduction. Wiggins, too, contributed to the effort, constructing an IPC taxonomy (Wiggins 1979).

2.1.3.1 Timothy Leary (1920 – 1996) and the Kaiser Foundation Group

While authorship of the Interpersonal Circumplex is generally ascribed to Timothy Leary (Leary 1957) - due to his curious sole authorship of the “brilliant” landmark book *Interpersonal Diagnosis of Personality* on the subject (Kiesler 1996) – it is more correct, however, to collectively recognize Dr. Hubert Coffey, faculty sponsor, and the triumvirate of graduate students: Mervin Freedman, Timothy Leary, and Abel Ossorio (Freedman et al. 1951). Also deserving of recognition are Rolfe LaForge and Robert Suczek (LaForge et al. 1955). Coffey, Freedman, Leary, and Abel initially worked together while at University of California–Berkeley and later at The Kaiser Foundation Hospital in Oakland, CA. LaForge and Suczek were also members of the Kaiser group. (LaForge was a research assistant and Suczek was a chief psychologist at The Kaiser Foundation Hospital Permanente Psychiatric Group.) The Kaiser Group attributes their theoretical foundations to interpersonal theorist Harry Stack Sullivan (1892-1949): “Our emphasis upon the immediate interpersonal aspects of personality may be regarded as an extension of the work of Harry Stack Sullivan⁸” (Freedman, Leary et al. 1951) (p. 145).⁹

⁸ Sullivan’s work was published posthumously in 1953.

⁹ Wiggins (1996) notes that the Kaiser Foundation Group’s attribution to Sullivan and declared extension of his theory, however, is never clearly explained by the Kaiser Foundation Group; Wiggins suggests, however, that “they (KFG) may, in fact, have rediscovered an earlier wheel-like structure” that illustrated Sullivan’s concept of an “interpersonal situation (p. 7). ...The sectors within each of the circular diagrams

Wiggins (Wiggins 1996) points out that their attribution to Sullivan was never quite elaborated, and Wiggins suggests that the cause for attribution may be due to the Kaiser group's 'rediscovery' of one of Sullivan's wheel-like structures that he used to illustrate an "interpersonal situation;" further, Sullivan's "rose diagrams" are strikingly similar to the ones that the Kaiser Group (LaForge et al. 1954) would later publish (Wiggins 1996).

2.1.3.2 Harry Stack Sullivan (1892-1949)

Sullivan (Sullivan 1953) believed that an individual's personality arises from and is maintained by one's interpersonal or bi-directional interactions with key others: "personality is the relatively enduring pattern of recurrent interpersonal situations which characterize a human life" (p. 110-111). Behavior is a function of mutual influence, that is, behavior is bi-directional. "Interactants' interpersonal needs always seek conjoint expression and reliability; hence, interpersonal behavior can be understood only from a systems perspective" (Kiesler 1983) (p. 186). Interpersonal needs and conjoint satisfaction would be seen as a function of two primary personality dimensions, control and affiliation.

2.1.3.3 Control and Affiliation (a.k.a. Agency and Communion)

Carter (Carter 1954) and later Borgatta et al. (Borgatta et al. 1958) corroborated the notion of two primary personality factors, in essence, Control and Affiliation; these two personality factors may be accountable for the major portions of behavior variance (Borgatta et al. 1958; Carson 1969; Carter 1954). Leary and colleagues at the Kaiser Foundation began operationalizing Sullivan's concepts and units of the Control and

indicate 'major motivational systems' in a representation that strikingly foreshadows that published later by the Kaiser Group (LaForge, Leary, Nabors, Coffey, & Freedman, 1954)" Wiggins, J.S. "An Informal History of the Interpersonal Circumplex Tradition," *Journal of Personality Assessment* (66:2), 1996, pp. 217-233. (p. 221). LaForge and Suczek who also both worked for The Kaiser Foundation Hospital first published on construction of the first circumplex inventory, the Interpersonal Check List LaForge, R., and Suczek, R.F. "Interpersonal Dimensions of Personality: Iii. An Interpersonal Check List," *Journal of Personality* (24), 1955, pp. 94-112. Kiesler, D.J. "From Communications to Interpersonal Theory: A Personal Odyssey," *Journal of Personality Assessment* (66:2), 1996, pp. 267-282. (p. 268). In essence, while the creation of Interpersonal Circumplex, itself, is most often associated with the famed Timothy Leary, it was the product of many during the 1950's. More recently, in the late twentieth and early twenty-first centuries, advancement of Interpersonal Circumplex theory may most be associated with Donald Kiesler and Jerry Wiggins.

Affiliation dimensions (Carson, 1969) (p. 103). With the intersection of Control and Affiliation (the axis) representing neutral values of each dimension, Leary and colleagues found that sixteen distinct personality traits could be mapped rather evenly around the axis based on their composition of Control and Affiliation (Agency and Communion), forming a circumplex (Carson, 1969). (See Appendix for Figure A1, Timothy Leary's 1957 Interpersonal Behavior Circle.)

2.1.4 Interpersonal Circumplex Explained

2.1.4.1 Interpersonal Traits

An individual's tendency to engage in certain interpersonal behaviors may be identified based on the circumplex. The circumplex is bisected and quartered by the orthogonal dimensions of Control and Affiliation (respectively depicted as vertical and horizontal axes). One's dominant personality trait is a combination of those two dimensions – Control and Affiliation – and falls in one of the four quadrants, whereby the degree of strength of Affiliation and Control determines one's more dominant or presiding trait. For example, if – in comparison to the mean of his/her sample group - an individual's affiliation and control scores are both above the sample group's means, then that individual would fall in Quadrant IV, the "Friendly-Dominant" quadrant. On the other hand, if an individual's affiliation is above the mean and his/her control score is below the mean, then – by comparison to the sample pool – that individual would fall in Quadrant III, the "Friendly-Submissive" quadrant. A review of the various diagrams advanced to illustrate the IPC (Kiesler 1983), (Strong & Hills, 1986), and (Wiggins, 1988) will help the reader better visual the dimension-trait relationships.

The four quadrants are further sub-divided into additional trait vectors. In its most detailed form, the IPC scales identify sixteen distinct personality types. The sixteen traits (labeled A-P, counter-clockwise from the top) are located around the circle based on their composition of Agency and Communion (Control and Affiliation). (See Appendix for Figure A2, Kiesler's Interpersonal Circumplex with Levels.) The intersection of these eight vectors at the origin may be viewed as representing the sample's norm for Agency and Communion (Control and Affiliation). It is actually, a bit more complicated than that: the average score for each of the vectors is determined and each vector's average is set to

be at the graph's origin. The origin for each trait vector represents the sample average for each trait. One's composite score across the dimensions is depicted as a point along on a vector and the distance from the origin represents the degree of departure from the norm of the respective trait(s).¹⁰

2.1.4.2 Scatter Plots

Each individual's traits *scores* would most accurately be represented as a scatter plot against the IPC, and the individual's control and affiliations scores along each vector would represent the degree to which the individual departs from that trait norm. The scatter of these points influences the individual's ultimate, net trait score, representing the prevailing trait strength on the IPC; however, on an individual-by-individual basis, it should be kept in mind that an individual's personality¹¹ is a manifestation of a variety of behaviors, some exhibited or inhibited more often than others, depending on the context. Take, for instance, the Ph.D. graduate student-lecturer who may be 'leading-extroverted' with his students, is conversely 'submissive-cooperative' with his dissertation committee.

2.1.4.3 Kiesler's Circumplex Levels Explained

Donald Kiesler (Kiesler 1983; Kiesler 1985) illustrates the varying degrees of traits with additional circumplex models mapping varying "levels" of behavior. Referring to *Figure A2*, Kiesler's IPC with Levels (which may be found in the Appendix), imagine that as the level of Affiliation increases while the degree of Control remains neutral or within the norm, that individual's behaviors would be represented as moving along the "M vector" labeled "Friendly," outward to a point M1 labeled "Cooperative Helpful," and if more excessive, then out to point M2, labeled "Devoted Indulgent." For instance, at mild-to-moderate levels of Affiliation, one is characterized

¹⁰ While the intersection represents the norm of the respective traits being plotted, this is not to suggest that the origin is where the average individual would be, nor would it imply a healthy "normalcy." On the contrary, the axis represents the average point for each of the trait vectors, *respectively*. The average individual's trait behaviors would be distributed around the IPC (this is considered healthy), but one's responses to IPC scales generally produce a cluster around one of the vectors.

¹¹ Personality, as explained by Sullivan is "the relatively enduring pattern of recurrent interpersonal situations which characterize a human life" Sullivan, H.S. *The Interpersonal Theory of Psychiatry*, W.W. Norton, New York, 1953. (p 110-110) cited by Carson Carson, R.C. *Interaction Concepts of Personality*, Aldine, Chicago, IL, 1969. (p. 25).

as “friendly;” as his Affiliativeness (or communality) increases, he exhibits more “cooperative and helpful” behavior; but, as his degree of Affiliation becomes more excessive, the individuals’ behavior is characterized as “devoted-indulgent” or “placating-indulgent.” It is at the extremes, where one’s functionality is related to distress and maladaptive behaviors ((Gurtman 1992b) citing (Carson 1969; Kiesler 1983)).

Kiesler (Kiesler 1985) provides the following translation into ‘acts’ for M1 Cooperative-Helpful and for M2 Placating-Indulgent:

M1 COOPERATIVE-HELPFUL: This person (a) tries hard to be thoughtful of others, and is careful to respect other’s rights; (b) can be expected to speak softly and tactfully, finds it easy to remain patient with irritations, works over to smooth over disagreements, and is difficult to rile; (c) cooperates easily, is ready to do his or her part, and seems eager to accede to requests from others; (d) seeks to comfort others, and is quick to offer help; and (e) impresses others as being courteous, pleasant, and supportive (p. 34).

M2 PLACATING-INDULGENT: This person (a) scrupulously considers others’ feelings first and goes out of his or her way to respect others’ rights; (b) is soft-spoken no matter the provocation, seems incapable of complaining or griping, can be counted on to defuse tense situations, and seems impossible to rile; (c) constantly does more than his or her part, and can’t seem to stop accommodating others; (d) compulsively spends energy doing for others, regularly self-sacrifices for others, and indulges and dotes on others; and (e) strikes others as being overcivil, selfless, and always succorant (p. 35).

As another example, again referring to *Figure A2*, imagine that as the level of Hostility (non-communal) increases while the degree of Control remains low that individual’s behaviors would be represented as moving along the “D vector,” which is labeled Cold. As one’s scores outward along this Cold D vector – that is with a Hostile score increasing, while the Control score remains low – then one’s score moves outward to D1 and is said to exhibit “Critical-Punitive” behavior. If more excessive, then out to point E2, where one’s behavior may be characterized as “Censorious-Damning.”

Kiesler (Kiesler 1985) provides the following descriptions for D1 “Cold Punitive” (aka “Critical-Punitive”) and for D2 “Icy-Cruel” (aka “Censorious-Damning”). See

Kiesler (Kiesler 1983) for illustrations and Kiesler (Kiesler 1985) for detailed translation for each of the 16 dimensions.

D1 CRITICAL PUNITIVE: This person (a) is quick to find fault with others, and to judge others strictly; (b) regularly expects best efforts from others, insists on firm discipline, lays down prohibitions, expects exact compliance to rules, and finds it hard to accept excuses; (c) sets tough conditions for his or her acceptance of others, is careful to withhold warmth and approval, and seldom bestows praise; and (d) impresses others as being hard-hearted, strict, and unfeeling (p.16).

D2 CENSORIOUS-DAMNING: This person (a) judges others harshly and severely, can't seem to stop finding fault, and finds it impossible to ever "bend" his or her standards in judging others' conduct; (b) demands absolute compliance to rules, insists on severed discipline and punishment, condemns others for transgressions, requires that retributions be made and disdains any excuses; (c) seems incapable of showing acceptance, spurns any show of warmth, and seems incapable of praising anyone; and (d) strikes others as being callous, cold-hearted, and ruthless (p. 17).

Regarding the upcoming hypotheses, mindfulness of these varying levels of behaviors as described by Kiesler (Kiesler 1983; Kiesler 1985) is helpful. The hypotheses will pertain to those individuals who are moderate (or low to moderate) in their respective quadrants or octants. To ensure distinction from those who are at the extremes (that is, being high in a particular trait, compulsively exhibiting certain behaviors), the low-to-moderate-in-trait participants in the hypotheses will simply be identified as "moderates."

2.1.4.4 Comparison of Interpersonal Circumplex Models

Scholars have developed a number of interpersonal circumplex models (Carson 1969; Kiesler 1983; Kiesler 1985; Leary 1957; Locke 2000; Locke et al. 2007; Myllyniemi 1997; Strong et al. 1986; Strong et al. 1988b; Wiggins 1979) that are rotated to slightly varying degrees and whose vectors may be represented with different descriptors. Given their subtle differences they generally confirm to the same structure and correlate closely. Traits are defined by their blend of Control (agency, dominance, power, status) and Affiliation (communion, friendliness, warmth, love); (Carson 1969; Kiesler 1983; Leary 1957; Locke 2000; Strong et al. 1986; Wiggins 1979). For purposes

of simplicity, Wiggins collapsed the sixteen trait vectors within his IPC into eight (Wiggins et al. 1988) (*Figure A3*, Wiggins's Revised IPC, in Appendix). The pairings still represent blends of Control and Affiliation and maintain reliability, retaining significant discretionary and statistical properties (Wiggins et al. 1988). It should also be noted that, in addition to pairing the traits, the singular letter references (A through P) that parenthetically follow for each respective trait are also paired in Wiggins's revised IPC format.¹² These letters may help the reader more easily reference and visualize where each respective trait is around the circumplex. For purposes of this study, I will use Locke's Circumplex Scales of Interpersonal Values. In addition to being well-validated and demonstrating conformity to the principles of Leary's IPC theory and specifically to scales of Kiesler's IPC (Kiesler 1983), Locke makes his system of scales and scoring available in the public domain (Locke 2000).

2.1.4.5 Validation for and Application of the Interpersonal Circumplex

The principles of the IPC have been extensively investigated and confirmed (Gains Jr. et al. 1997). IPC instruments have been investigated and refined for their psychometric properties and have been demonstrated in numerous studies (Benjamin 1996; Gains Jr. et al. 1997; Gurtman 1992a; Kiesler 1983; McCrae et al. 1989; McCrae et al. 1997; Moskowitz 1994; Sadler et al. 2003; Strong et al. 1986; Strong et al. 1988a; Tracey 1994; Tracey et al. 2001; Trapnell et al. 1990; Wiggins 1979; Wiggins et al. 1988). IPC's have been employed in a variety of research. As Locke notes, "the IPC has been used to describe, organize and compare interpersonal adjectives,"¹³ (Conte et al. 1981; Wiggins 1979), personality scales (Gurtman, 1997; Wiggins & Broughton, 1991), interpersonal transactions (e.g. (Horowitz et al. 1991); (Tracey 1994)), (and) interpersonal problems (e.g. (Alden et al. 1990); Gurtman, 1996)..." (Locke 2000) (p. 249-250). Further, the IPC has been used to identify career preferences (Broughton et al. 1991). The theory of trust behind the IPC has been extensively investigated and the validity of the constructs underlying it confirmed (Gains Jr. et al. 1997; Gurtman 1992b).

¹² For instance, singular traits arrogant (B) and calculating (C) become octant "arrogant/calculating (BC)"; likewise, traits cold (D) and hostile (E) become octant "cold/hostile (DE)."

¹³ The "interpersonal adjectives" are trait descriptors. These adjectives reflect different combinations and levels of Control and Affiliation. Arrayed around the axis of Control and Affiliation, these adjectives are then used to describe interpersonal behaviors and, thus, an individual's predominant trait along the IPC.

Given the IPC's pertinent nomological net, it provides a good fit with existing models of trust and participant interaction in the virtual environment.

2.1.4.6 Interpersonal Effects

By identifying interpersonal traits that impact interactions and trust, the IPC enables us to make predictions. In general, I will hypothesize that one's governing IPC trait effects an individual's perceptions and evaluations of technology, including the level of trust that an individual projects onto an information system. In the context of this experiment, the information system is a computer-based learning system.

Before advancing from the IPC to the TAM model, it is first necessary to introduce three additional personality theories that serve to reify and complement the IPC and this theoretical framework. The personality theories that follow are the following: the Mood Model of Affect, the Five Factor Model (FFM); and Holland's RIASEC Preferred Occupations Theory. For each model, I will provide a brief overview of its theory; following this introduction, I will then explain how that particular model corresponds with whichever model(s) may have been introduced before it, such as the IPC. The next sections provide some background and context for the three models – Affect Model, the FFM, and Holland's RIASEC. While connections between the IPC and computer anxiety, etc. can be made, in some cases, the rationales need further elaboration. In order to help accomplish this, I am going to introduce three complimentary and supporting personality models that relate to the IPC and also to the TAM-related constructs. These additional models will help me articulate more specific predictions regarding relationships. Therefore, I ask that you please bear with me, while I introduce these three models. Following their introductions, I will then present the TAM-related constructs of interest, their relationships to the highlighted personality theories, and provide integrative theoretical foundations for the subsequent hypotheses, regarding the TAM-related variables and the IPC.

2.2 MOOD MODEL: AFFECTIVITY AND POSITIVE & NEGATIVE AFFECT

Mood may be assessed in terms of bi-polar dimensions. Mood research has identified several bi-polar mood dimensions: ‘Positive-Negative,’ ‘Pleasantness-Unpleasantness,’ and ‘Arousal’ (a.k.a. ‘Activation’) (Purcell 1982). *Positive Affect* (PA) and *Negative Affect* (NA) are considered to be two major mood dimensions (Costa Jr. et al. 1980; Watson et al. 1984b; Watson et al. 1985). These major bi-polar dimensions are also related to an individual’s personality traits (Costa Jr. et al. 1980; Warr et al. 1983; Watson et al. 1984a). This research will use the more firmly established, stable and robust dimensions of Positive Affect and Negative Affect (Watson et al. 1985). Watson, Clark, and Tellegen (1988) provide the following descriptions of PA and NA:

Briefly, Positive Affect (PA) reflects the extent to which a person feels enthusiastic, active, and alert. High PA is a state of high energy, full concentration, and pleasurable engagement, whereas low PA is characterized by sadness and lethargy.

In contrast, Negative Affect (NA) is a general dimension of subjective distress and unpleasurable engagement that subsumes a variety of aversive mood states, including anger, contempt, disgust, guilt, fear, and nervousness, with low NA being a state of calmness and serenity. (p. 1063)¹⁴

¹⁴ While the above definitions use the term “state” (e.g. “state of high energy” and “aversive mood states”), others view Affect as being as much a pervasive “trait” and dispositional disposition Costa Jr., P.T., and McCrae, R.R. "Influence of Extraversion and Neuroticism on Subjective Well-Being: Happy and Unhappy People," *Journal of Personality and Social Psychology* (38:4), 1980, pp. 668-678, Watson, D., and Clark, L.A. "Negative Affectivity: The Disposition to Experience Aversive Emotional States," *Psychological Bulletin* (96), 1984a, pp. 465-490, Watson, D., and Tellegen, A. "Towards a Consensual Structure of Mood," *Psychological Bulletin* (98:2), September 1985, pp. 219-235.. (The distinction between ‘state’ and ‘trait’ concerns duration; in regards to Affect, the two are found to be related Tellegen, A. "Structures of Mood and Personality and Their Relevance to Assessing Anxiety, with an Emphasis on Self-Report," in: *Anxiety and the Anxiety Disorders*, A.H. Tuma and J.D. Maser (eds.), Erlbaum, Hillsdale, NJ, 1985, Watson, D., and Clark, L.A. "Negative Affectivity: The Disposition to Experience Aversive Emotional States," *Psychological Bulletin* (96), 1984a, pp. 465-490. and, therefore, for our purposes, will be considered enduring traits.) Further, reifying their validity and prominence, PA and NA are found to be dominant dimensions across cultures Russell, J.A., and Lewicka, M. "A Cross-Cultural Study of a Circumplex Model of Affect," *Journal of Personality and Social Psychology* (57:5), 1989, pp. 848-856, Watson, D., Clark, L.A., and Tellegen, A. "Cross-Cultural Convergence in the Structure of Mood: A Japanese Replication and Comparison with U.S. Findings," *Journal of Personality and Social Psychology* (47:1), 1984b, pp. 127-144.

Positive Affect (PA) and *Negative Affect* (NA) are two independent affective structures; they are not opposite ends of a singular pole or negatively correlated, but rather they are distinctive dimensions (McCrae et al. 1991; Tellegen 1985; Warr et al. 1983; Watson et al. 1984a; Watson et al. 1985). They are “*descriptively bipolar* but *affectively unipolar* dimensions” (Zevon et al. 1982) (p. 112). Further, supporting their validity and prominence, PA and NA are found to be dominant dimensions across cultures (Russell et al. 1989; Watson et al. 1984b).

High PA is associated with patterns of social interaction: frequency of social contact, acquaintances, attendance at and involvement with sporting events and social organizations (Watson et al. 1984a). Similarly, low-NA persons are found to be more gregarious, sympathetic, and dependable, and agreeable to be around (Watson et al. 1984a). In contrast, high-NA persons are *more likely* to experience distress across situations; they are sensitive to irritations, frustrations, and failures of daily life; and, thus, high NA persons magnify these disappointments and threats (Watson et al. 1984a). Block describes High-NA’s as hostile, distrustful, aloof, rebellious, and nonconforming ((Block 1965) cited by (Watson & Clark, 1984)).

Tellegen (Tellegen 1985) produced a Two-Factor Structure of Affect (see Appendix for Figure A4). Watson and Tellegen (Watson and Tellegen 1985) explain how to interpret Tellegen’s Two-Factor Structure of Affect (see as follows: the singular mood terms represent each respective octant. The terms within each respective octant are highly positively correlated; terms in adjacent octant are moderately positively correlated. Word terms ninety degrees apart would be considered orthogonal; word terms one-hundred degrees apart or on opposite poles are antonyms, having opposite meanings, and are highly negatively correlated. (p. 221) In explaining the two-factor structure, Watson and Tellegen (1985) state that the image may be rotated any number of ways. While the Affect model does not map perfectly to the IPC, rendition provided here is slightly more in-line with the IPC. It may also be helpful to the reader to consider imaginatively rotating the two-factor structure forty-five degrees clockwise, thus placing high positive affect along the Northeast side, and moving unpleasantness and pleasantness along the horizontal axis.

2.2.1 Affect and Interpersonal Circumplex

Positive Affect (PA) is related to extraversion (Costa Jr. et al. 1980; McCrae et al. 1989; Warr et al. 1983) and dominance (Saucier 1992). Negative Affect (NA) is more generally located on the acommunal (hostile) side of the IPC. In a study of NA group differences, high NA subjects¹⁵ reported themselves on Leary's (1957) original Interpersonal Circumplex (IPC) as being more rebellious/distrustful (FG), self-effacing/masochistic (HI), and aggressive/sadistic (DE) – all three octants on the 'Hostile' side of the IPC (Altrocchi et al. 1960).

2.2.2 Affects' Evaluative Effects

Affect influences evaluations of both self and other (Baldwin et al. 1972; Bass et al. 1961; Graziano et al. 1980; Kaplan 1968). Low-NA individuals give more favorable peer and other ratings (Bass et al. 1961; Graziano et al. 1980) and “eschew the ruthless honesty of high-NA individuals” (Watson et al. 1984a) (p. 484). What might account for evaluating thus? Positive Affect (PA) is related to experiencing pleasant events (and not related to experiencing unpleasant events) and that NA is related to experiencing unpleasant events (and not related to experiencing pleasant events) (Clark et al. 1988; Watson et al. 1988);¹⁶ these contrasting sensitivities, may consequently predispose PA's and NA's to their respective biases. Further, individuals high in NA – in contrast to those low in NA – dwell upon and magnify mistakes, they are also associated with having low self-esteem (Watson et al. 1984a). Individuals who have a positive view of themselves, tend not to be anxious and critical of others (Emmons et al. 1985) (p. 94).

¹⁵ In the Altrocchi, Parsons, et al. (1960) study the high-NA subjects were actually termed “sensitizers.” Sensitizers were described in terms similar to those high-NA “attuned to and (tending) to ruminate about threat, conflict, and the negative qualities of themselves and others (Gordon, 1959)” (p. 67).

¹⁶ See Clark and Watson, 1988, and Watson et al. 1988 for more references

2.3 PERSONALITY MODEL: NEO FIVE FACTOR MODEL

The Five Factor Model (a.k.a. FFM) is a widely regarded personality model that distinguishes individuals along the following five factors or dimensions: Neuroticism, Extraversion, Openness to Experience, Agreeableness, and Conscientiousness (Costa Jr. et al. 1991; McCrae et al. 1987).¹⁷ Of these, Extraversion and Agreeableness are considered to be the most intrinsically interpersonal of the dimensions: they “appear to determine directly the amount of social stimulation preferred and the prevailing quality of social interaction” (McCrae et al. 1989) (p. 586). These five factors are composed of – or may be sub-divided into – six *facets* (Sullivan and Hansen, 2004, referencing Costa & McCrae, 1992b (Costa Jr. et al. 1992)). For example Extraversion is composed of Warmth, Assertiveness, Gregariousness, Activity, Excitement-Seeking, and Positive Emotions. While the facets are interrelated, they are intended to represent distinct facets of Extraversion (Sullivan et al. 2004). At present, the leading theorists of the Five Factor Model (FFM) are Costa and McCrae.

Digman (Digman 1990) traces the historical roots of the FFM¹⁸: Building upon the earlier lexical approach (or natural language adjectives studies or personality-language-analyses) work of Allport and Odbert (Allport et al. 1936), and Cattell (Cattell 1943; Cattell 1946; Cattell 1947; Cattell 1948), Fiske (Fisk 1949) first identified – and Tupes and Christal (Tupes et al. 1961; Tupes et al. 1992) later supported – five factors of personality: *Surgency*, *Agreeableness*, *Dependability*, *Emotional Stability*, and *Culture*. Subsequently, the Five Factor model has evolved into a widely regarded personality model. The commonly known five factors – Neuroticism, Extraversion, Openness to Experience, Agreeableness, and Conscientiousness – provide “more or less a comprehensive taxonomy of personality traits” ((McCrae & Costa, 1991, citing Digman, 1990; McCrae & Costa, 1987)).

¹⁷ While McCrae and Costa’s FFM terms have wide acceptance, they recognized that others use similar but slightly different terms: *Extraversion* – Surgency (Norman, 1963), Social Activity (Guilford, Zimmerman, & Guilford, 1976); *Openness to Experience* – Intelligence (Hogan 1983), Culture (Norman, 1963) and Intellect (Digman and Takemoto-Chock, 1981); *Agreeableness* – Affection (Brand, 1984), likeability (Hogan 1983) and Socialization (Lorr, 1986). *Conscientiousness* – Conformity (Hogan 1983), Will to Achieve (Digman & Takemoto-Chock, 1981). Neuroticism has Emotional Stability at its opposite pole; Hogan (1983) termed it Adjustment.

¹⁸ For a more thorough review of the history, see Digman (1990) and John, Angleitner, Ostendorf (1988).

<i>Neuroticism</i>	Emotional distress accompanied by disturbed thoughts and behaviors a negative emotionality (McCrae et al. 1987); tendency to experience negative affects, including anger, anxiety, depression, and embarrassment (Tellegen 1985).
Facets	Anxiety, Hostility, Depression, Self-Consciousness, Impulsiveness, Vulnerability (Costa Jr. et al. 1991)
<i>Extraversion</i>	Sociable, centered on gregariousness (McCrae et al. 1989); is related to the desired level of social stimulation (Costa Jr. et al. 1991); but also includes warmth, assertiveness, activity, excitement seeking, and positive emotions (McCrae et al. 1989).
Facets	Warmth, Assertiveness, Gregariousness, Activity, Excitement-Seeking and Positive Emotions (Costa Jr. et al. 1991)
<i>Openness</i>	“Original, imaginative, broad interests, and daring” (McCrae et al. 1987). Manifests in “a rich fantasy life, aesthetic sensitivity, awareness of inner feelings, need for variety in actions, intellectual curiosity, and liberal value systems” (McCrae et al. 1985) (p. 145).
Facets	Fantasy, Aesthetics, Feelings, Actions, Ideas, and Values (Costa Jr. et al. 1991)
<i>Agreeableness</i>	reflects the character of interaction “along a continuum from compassion to antagonism” (Costa Jr. et al. 1985) p. 2 cited by (Costa Jr. et al. 1991).
Facets	Trust, Straightforwardness, Altruism, Compliance, Modesty, and Tender-Mindedness (Costa Jr. et al. 1991)
<i>Conscientiousness</i>	Scrupulousness, reflects one’s thoroughness, carefulness, sense of being governed by conscience; also hardworking, ambitious, energetic, persevering (McCrae et al. 1987) (p. 88).
Facets	Competence, Order, Dutifulness, Achievement Striving, Self-Discipline, and Deliberation (Costa Jr. et al. 1991)

2.3.1 Five Factor Model and AFFECT

Extroversion and *Sociability* is related to Positive Affect (PA); *Neuroticism* and anxiety is related to Negative Affect (NA) (Costa Jr. et al. 1980; Emmons et al. 1985; McCrae et al. 1991; Meyer et al. 1989; Saucier 1992; Tellegen 1985; Warr et al. 1983; Watson et al. 1984a). *Openness to Experience* has been found positively correlated with both PA and NA (Costa Jr. et al. 1984a). *Agreeableness* correlates to PA (positively) and NA (negatively) (McCrae et al. 1991; Saucier 1992; Watson et al. 1992), as does

Conscientiousness; however, the correlations of *Agreeableness* and *Conscientiousness* to PA and NA may be more modest than *Extroversion* and *Neuroticism*'s (McCrae et al. 1991; Watson et al. 1992).

2.3.2 Five Factor Model and Interpersonal Circumplex

A number of different efforts have been made to map the NEO Five Factor Inventory to the IPC (Ansell et al. 2004; Markey et al. 2006; McCrae et al. 1989; Pincus et al. 1998; Saucier 1992; Schmidt et al. 1999; Warr et al. 1983; Wiggins et al. 1994). There is widespread agreement that the IPC dimensions of Agency (Control) and Communal (Affiliation) map to the – or are ‘defined by’ – FFM factors of *Extraversion* and *Agreeableness*, respectively (McCrae et al. 1989; Saucier 1992; Schmidt et al. 1999; Trapnell et al. 1990). Trapnell and Wiggins (1990) describe these two FFM factors as “rotational variants” of the IPC’s major dimensions Dominance (Agency) and Affiliation (Communion). “The interpersonal circumplex is defined by the two [FFM] dimensions of Extraversion and Agreeableness” (McCrae et al. 1989) (p. 586). Further, the FFM factor *Agreeableness* – which reflects the quality of interaction “along a continuum from compassion to antagonism” ((Costa Jr. et al. 1985) p. 2 cited by (Costa Jr. et al. 1991)) – is most comparable to the Affiliative axis of the IPC, from Nurturing to Hostility (McCrae et al. 1989). (In terms of the more recent transition to the dimensions of Agency and Communal, McCrae and Costa’s finding would be the following: is most comparable to the Communal axis of the IPC, from Communal to Non-Communal.)

More specifically McCrae and Costa (McCrae et al. 1989) found that IPC Communal-Agentive (Friendly-Dominant) quadrant IV octants – gregarious/extraverted (NO), assured-dominant (PA), and warm/friendly (LM) – loaded positively on the FFM factor Extraversion. Conversely, the IPC Acommunal-Unagentive (Hostile-Submissive) quadrant II octants – cold/hostile (DE), aloof/introverted (FG), and unassured/submissive (HI) – loaded negatively on the FFM factor Extroversion.

Loading positively on the FFM factor Agreeableness, were the octants from the IPC Communal-Unagentive (Friendly-Submissive) quadrant III – unassuming/ingenuous (JK), warm/friendly (LM), and unassured/submissive (HI). Conversely, the IPC Acommunal-Agentive (Hostile-Dominant) quadrant I octants – assured/dominant (PA),

arrogant/calculating (BC), and cold/hostile (DE) – loaded negatively on the FFM factor Agreeable. In effect, where one quadrant was positively correlated to a factor (quadrant 1 to Extroverted, for instance), it's polar or quadrant opposite was negatively correlated (e.g. quadrant 3).

When endeavoring to extend the IPC scales to include the FFM dimensions of personality, Trapnell and Wiggins (Trapnell et al. 1990) analysis yielded the following loadings for FFM *Agreeableness*: Tender-hearted (.76), Gentle-hearted (.76), Soft-hearted (.69), Kind (.68), Tender (.66), Charitable (.62), Sympathetic (.59), Accommodating (.41). Similarly, Costa et al. (Costa Jr. et al. 1991) identified the following facets of FFM *Agreeableness*: trust, straightforwardness, altruism, compliance, modesty, and tender-mindedness. *Openness of Experience* aligns closely with the IPC Friendly dimension and correlates with octant warm-agreeable (LM) (Schmidt et al. 1999) and octant gregarious-extroverted (NO) (Ansell et al. 2004).

On the Communal (Affiliative) hemisphere of the IPC, Kiesler (Kiesler 1983) labels a narrow band of vectors around the Affiliative dimension as Trusting, Warm, Friendly, and Sociable. In a wider reach, Wiggins (Wiggins 1979) associates the following octants of the affiliative hemisphere with the following adjectives (from southeast Friendly-Submissive to northeast Friendly-Dominant): (1) with IPC octant ingenuous/unassuming (JK): modestly, un-argumentative, and trusting; (2) with IPC octant warm/friendly (JK):

warm, appreciative, and cooperative; and (3) with IPC octant gregarious/extravert (NO): approachable, congenial, and enthusiastic. In essence, IPC traits within the affiliative dimension are associated with more ‘positive’ behaviors – the inverse of negativism or pessimism.

Ansell and Pincus’s (Ansell et al. 2004) mapping of all five factors and their resulting quadrant and octant correlations on the IPC are generally indicative of the others’ efforts:

- High Neuroticism maps to the IPC in the Southwest quadrant II, in the cold-submissive octant.
- High Conscientiousness maps to the IPC, due North in assured-dominant octant. (In contrast, Schmidt, Wagner, and Kiesler (Schmidt et al. 1999) found that Conscientiousness mapped East to the warm-friendly (LM) octant.)
- Low Agreeableness maps to the IPC, north-westerly (160 degrees) in Quadrant I;
- Conversely, High Agreeableness maps to the warm-submissive octant of Quadrant III.
- Low openness maps to Quadrant II and the aloof-introverted octant;
Conversely, high openness maps to the gregarious-extravert octant of Northeast quadrant IV

[See Table 1. Mappings of the Five Factor Model to the Interpersonal Circumplex.]

Table 1. Mappings of Five Factor Model to the Interpersonal Circumplex

Five Factor Model	Prototypical-Scale	Ansell & Pincus (2004)	Schmidt et al. (1999)	Markey & Markey (2006)	Pincus (2002); Wiggins & Pincus (1994)	Saucier (1992)	McCrae & Costa (1989)
I. Extraversion	Bold-Timid	<u>High:</u> 55 Gregarious- Extraverted <u>Low:</u> 266	39 Friendly – Dominant	<u>High:</u> 45 Gregarious- Extraverted	<u>High:</u> 60 Gregarious- Extraverted	<u>High:</u> 68+/- Assur'd-Dom & Greg-Extr <u>Low:</u> Unassured- Submissive	<u>High:</u> 45 Gregarious- Extraverted
II. Agreeableness	Warm-Cold	<u>High:</u> 345 <u>Low:</u> 157	308 Friendly - Submissive	<u>High:</u> 312	<u>High:</u> 330	<u>High</u> Warm- Agreeable <u>Low</u> Cold-Hearted	<u>High:</u> 312
III. Conscientiousness	Thorough-Careless	<u>High:</u> 90 Assured- Dominant <u>Low:</u> na	356 Friendly	<u>High:</u> 87			
IV. Neuroticism (aka <i>Negative Affectivity</i> (Lippa 1995))	Relaxed-Tense	<u>High:</u> 260 Submissive (on the Cold side) <u>Low:</u> 20 Warm-Agreeable & Gregarious- Extrovert	220 Hostile- Submissive				
V. Openness	Intelligent-Unintelligent	<u>High:</u> 57 Gregarious- Extraverted <u>Low:</u> 225 Aloof-Introverted	348 Friendly				

2.4 OCCUPATIONAL THEORY: RIASEC PREFERRED OCCUPATIONS SCALE

In 1966, Holland (Holland 1966) advanced a psychological classification scheme for preferred vocations. (See Figure 2.) Subsequently elaborated and validated, the RIASEC hexagonal model bases vocational preferences based six personality types: Realistic (R), Investigative (I), Artistic (A), Social (S), Enterprising (E), and Conventional (C) (henceforth RIASEC) (Cole et al. 1971; Holland 1985; Holland et al. 1969). The six entities, Costa and McCrae (Costa Jr. et al. 1984b) point out, are not separate, discrete vocational boundaries but are instead related groupings based on their composition of the shared psychological features. The geometric aligning the six categories results in a hexagonal shape. Imagining lines drawn between each of the six categories, the hexagonal results in nine intra-class relationships. The six occupational categories are arranged such that adjacent main categories are most related: the closer the proximity of the category, closer the intra-class relationships. For instance, the Realistic category is relationally closer to Conventional and Investigative but further from Enterprising and Social respectively (Holland et al. 1969). Thus, it is unlikely that one would score both high Conventional interests, as well as Artistic interests. The principals and hexagonal geometry of Holland's RIASEC is well-validated, domestically (Cole et al. 1971; Holland et al. 1969; Oliver et al. 2005); however, it has provided poor to mixed results with cross-cultural differences and high school groups (Armstrong et al. 2003; Glidden-Tracy et al. 1996; Oliver et al. 2005; Rounds et al. 1996).

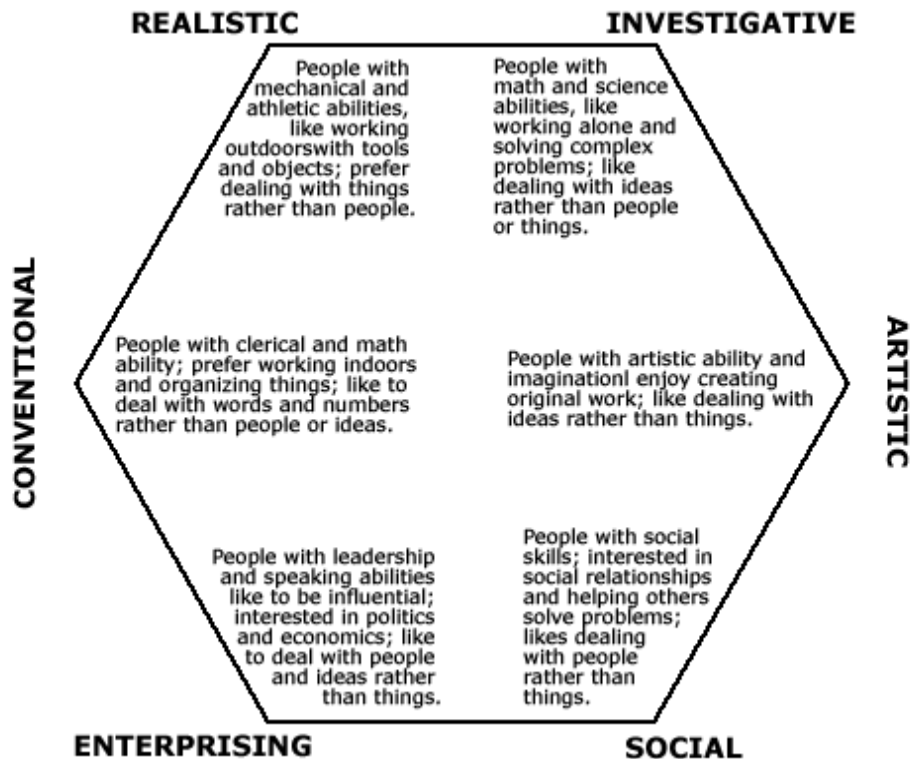


Figure 2. Holland's RIASEC Hexagon.

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The essence of the categories and preferences are as follows:

Realistic	technical and skilled trades
Investigative	scientific occupations
Social	teaching and helping occupations
Conventional	clerical occupations
Enterprising	supervisory and sales occupations
Artistic	artistic, musical, and literary occupations

To derive these categories, Holland (Holland 1966) used the following assessment devices: (1) Vocational Preference Inventory (Holland, 1965); (2) Preconscious Activity Scale (Nichols & Holland, 1963) to measure originality in art, literature, and music; (3) Range of Competencies (scale) inventorying knowledge of Robert's Rules of Order,

cooking, jewelry making; literacy with blueprints, languages, logarithm tables; and how to operate machinery; (4) Interpersonal Competency Scale (Foote and Cottrell, 1955); Dogmatism Scale (Rokeach, 1956) measuring dogmatic and rigid thinking; and the Student Orientation Survey, Form C (Faubus and Goodstein, 1964).

2.4.1 RIASEC and Prediger (Things v People)

Per Holland's RIASEC scale, Realistic types are mechanically oriented and, generally, score low interest in arts and people oriented jobs. (See Figure 2.) Belando and Winer (Bellando et al. 1985) found that Realistic types have a tendency to enroll more in more math courses ($r=.25$, $p < .06$) and computer courses ($r=.38$, $p < .01$). As far as sex differences, men tend to score higher on items closer to the "Things pole" such as Electrical and Technical, Data Inspection, Manual Labor, and Construction (Tracey 1997).

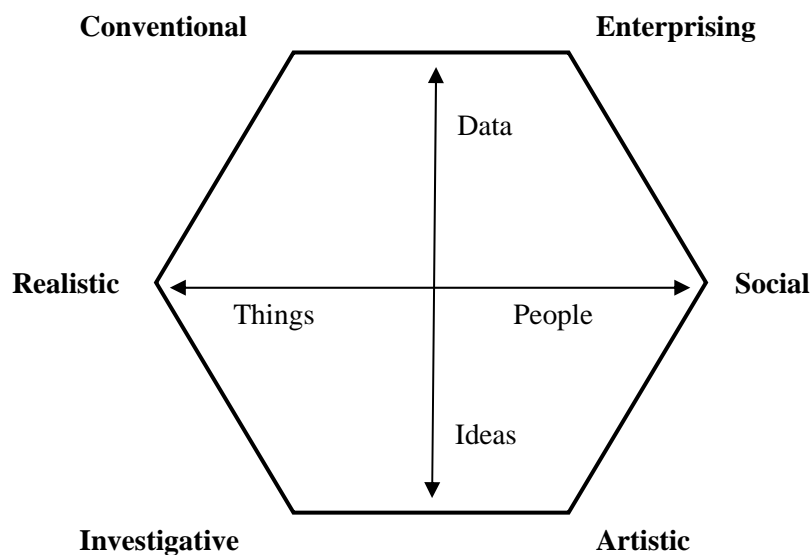


Figure 3 Holland's RIASEC typology, along with Prediger's Dimensions

2.4.2 RIASEC and Five Factor Model

Holland's RIASEC has also been shown to have correspondence with the Five Factor Model (FFM) (Costa Jr. et al. 1984b; Gottfredson et al. 1993; Saucier 1992; Schinka et al. 1997; Schmidt et al. 1999; Sullivan et al. 2004). Recall that the dimensions of the FFM are *Neurotic*, *Extroverted*, *Openness to Experience*, *Agreeableness*, and *Conscientiousness* (Costa Jr. et al. 1991; McCrae et al. 1987). The RIASEC Social interest correlates to the FFM *Extroverted* (Costa Jr. et al. 1984b; Gottfredson et al. 1993; Sullivan et al. 2004). The RIASEC Enterprising interest correlates to FFM *Extroverted* (Costa Jr. et al. 1984b; Gottfredson et al. 1993); however, this correlation to Enterprising, Sullivan and Hansen argue, may be a function of the Assertiveness facet of *Extraversion* (Sullivan et al. 2004).

The issue of the FFM *Openness to Experience* and its potential correlations presents some complexities. FFM *Openness* is found to be correlated to RIASEC Investigative and Artistic interests (Costa Jr. et al. 1984b; Gottfredson et al. 1993; Schinka et al. 1997). Sullivan and Hansen's (Sullivan et al. 2004) non-significant results regarding the correlations with *Openness*, questioned the previously suggested relationship between the RIASEC Investigative and Artistic and the FFM *Openness*; such correlations may be a function of very specific facets of FFM *Openness* (i.e. aesthetics, feelings, ideas, values, and fantasy). That is, *Openness to Experience* is composed of several facets (aesthetics, ideas, and feelings); thus, the aesthetic facet of *Openness* correlates to RIASEC Artistic; the ideas facet correlates positively to RIASEC Investigative – and the feelings facet correlates negatively. (See Figure 4, Sullivan and Hansen's Summary of Associations between Big-Five Facets and Interests.) Schinka (Schinka et al. 1997) found that the *Openness* also correlated to Enterprising (in addition to Investigative and Artistic). Costa et al. (Costa Jr., McCrae et al. 1984) suggested that the 'openness,' confidence, and enthusiasm of extraverts encourages extraverts to endorse occupational items of all kinds; whereas 'closed' individuals have only conventional interests).¹⁹

¹⁹ As an aside, FFM Agreeableness is positively related to FFM social and artistic in men Schinka, J., A., Dye, D.A., and Curtiss, G. "Correspondence between Five-Factor and Riasec Models of Personality," *Journal of Personality Assessment* (68:2), 1997, pp. 355-368.

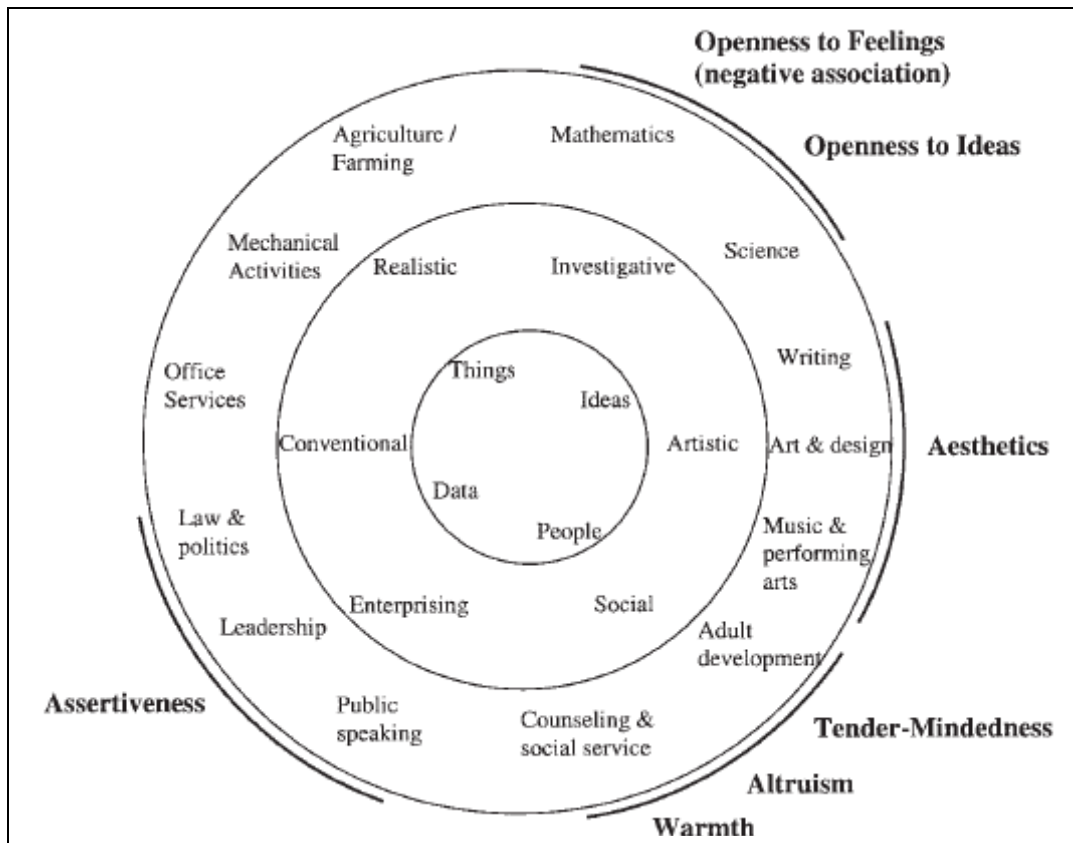


Figure 4. Sullivan and Hansen's *Summary of Associations between Big-Five Facets and Interests*.

Reprinted with permission from "Mapping Associations between Interests and Personality: Toward a Conceptual Understanding of Individual Differences in Vocational Behavior." By Sullivan, B. A. and J-I. C. Hansen, 2004, *Journal of Counseling Psychology* **51**(3): 287-298, Copyright 2004 by the American Psychological Association.

2.4.3 RIASEC and Interpersonal Circumplex

Schneider and Ryan (Schneider et al. 1996) found the RIASEC traits positively correlated to the Interpersonal Circumplex traits as follows:

- Realistic: arrogant/calculating (BC), cold/hostile (DE), aloof/introverted (FG);
- Conventional: cold/hostile (DE);
- Social: unassuming/ingenuous (JK), warm/friendly (LM), gregarious/extroverted (NO)
- Enterprising: gregarious/extroverted (NO), dominant/assertive/controlling (PA)

Though conducted in the pre-Internet and IT boom, a 1991 study on the IPC and occupational preferences (Broughton et al. 1991) had outcomes that arguably confirm the above results with the RIASEC. While the study had pre-IT boom occupation titles (businesses ‘discovered’ the Internet circa 1990), an intuitive, if not reasonable leap may be taken to associate some of the 1991 job aptitudes and dispositions with characteristics of present IT-related occupations. The Broughton et al. (Broughton et al. 1991) study found the following correlations (see Table 2) (the less pertinent occupations have been omitted):

Table 2. RIASEC Preferred Occupations Correspondence to the IPC Octants

(BC) Arrogance (.73)	(DE) Quarrelsome (.71)
1. Stock & bond sales	1. Credit investigator
2. Speculator	2. Inventory controller
3. Quality Control Inspector	3. Cost estimator
4. Bank examiner	4. Financial Analyst
5. School principal	5. Construction Inspector
6.	6. Scientific research worker
7. (-) Marriage counselor	7. Bookkeeper
8. (-) Speech Therapist	8. Budget Reviewer
9. (-) Personal counselor	9. (-) Missionary
10. (-) Vocational counselor	10. (-) Youth Camp Dir.

(FG) Introverted	(HI) Submissive (.69)
1.	1.
2.	2. Payroll clerk
3. Independent Research Scientist	3. Astronomer
4. Composer	4. IBM equipment operator
5. Writer of Scientific Articles	5. Radio Operator
6. Free-lance writer	6. Court Stenographer
7. Geologist	7.
8.	8. (-) Welfare worker
9. Meteorologist	9. (-) Sports promoter
	10. (-) Advertising Dir.

2.5 LOCUS OF CONTROL AND AGENCY/AUTONOMY

A personality variable, Locus of Control refers to the attribution that one assigns their fate (Rotter 1966). Those who believe that they are ‘masters of their fate’ are *Internals* and are considered alert, confident, and proactive in controlling their external environments. In contrast, those who do not believe that they are masters of their fate are *Externals* and are considered passive in regards to their external environments. Internals attribute outcome to personal effort and their actions. Externals attribute outcome to external factors or luck (Ng et al. 2006).

Autonomy refers to “auto (self) nomous (ruling)” individual (Hmel et al. 2002). In a study of 15 autonomy scales, the Five Factor Model, and Wiggins Interpersonal Adjective Scales (a.k.a. IPC), Hmel and Pincus identify two of three hypothesized factors as reflecting autonomy. Factor I, *Depressogenic vulnerability*, has high loadings on need for control, independence, solicitude, and perfectionism, however, the factor lacks agency and therefore should not accurately be labeled “autonomy” (Hmel et al. 2002). Factor II, *Self-governance*, reflects emotional, value, behavioral autonomy, as well as causality orientation autonomy and individualistic achievement (see Hmel and Pincus, 2002, for more detail). Factor III, *Agentic separation*, reflects an “independent form of autonomy.”

2.5.1 Locus of Control and Five Factor Model

Neuroticism is positively correlated to external Locus of Control (Costa Jr. et al. 1991; Raja et al. 1994; Rossier et al. 2005). The FFM factor Neuroticism maps to the southwest, Quadrant II (Hostile-Submissive) of the IPC; therefore, it is reasonable to surmise that those in IPC Quadrant II (Hostile-Submissive, scoring low on the Control/Power dimension) would be positively correlated to external Locus of Control. Low Conscientiousness is also related to external Locus of Control; in general the six facets of Conscientiousness – competence, order, dutifulness, achievement striving, self-discipline, deliberation – are negatively related to (external) Locus of Control (Costa Jr. et al. 1991; Rossier et al. 2005). The FFM factor Conscientiousness maps along the Communal dimension and warm/friendly octant of the IPC; therefore, similarly, it is

reasonable to surmise that those scoring neutral to dominant on the Control (Agency) dimension would be negatively correlated to external Locus of Control.

2.5.2 Autonomy and Interpersonal Circumplex Model

In the Hmel and Pincus (Hmel et al. 2002) study of autonomy, Factor I, “*Depressogenic Vulnerability*” (their term) was located at 186 degrees, placing it in the cold/hostile octant (DE) (just into the quadrant II side). Factor II, *Self-governance*, is located at 42 degrees, approximately bisecting the IPC Friendly-Dominant quadrant, thus placing it in the gregarious/extraverted (NO) octant. Factor II, *Self-governance*, indicates substantial interpersonal content (with a vector length of .70), reflecting dominance and love. (See Figure 5.) Because of its interpersonal blend of relatedness to others and dominance, Hmel and Pincus (Hmel et al. 2002) suggest that *self-governance* may be psychologically adaptive in nature. Factor III, *Agentic separation*, is located at 154 degrees, which is in the Hostile-Friendly quadrant (quadrant I) and only three degrees inside the borderline of arrogant/calculating (BC) from cold/hostile (DE). Factor III, *Agentic separation*, is negatively associated with Extraversion (warmth and gregariousness) it is positively associated with activity and assertiveness. More noteworthy, *Agentic separation* is positively associated with Conscientiousness (competence, dutifulness, and achievement striving), suggesting “that investment in non-interpersonal strivings may take precedence over relatedness strivings. In fact, it may reflect a compensatory outlet developed in response of unsatisfactory interpersonal relationships” (Hmel et al. 2002) (p. 303).

Due to difference between Factor II (*Self-governance*) and Factor III (*Agentic separation*) along the IPC Communal dimension, Hmel and Pincus (Hmel et al. 2002) suggest “that this reflects two distinct forms of autonomy, one ‘independent’ in nature and characterized by agency and interpersonal separation, the other ‘interdependent’ in nature and characterized by agency and interpersonal relatedness” (p. 303). Either way, both these facets of autonomy are found, as one would intuitively expect, in the northern hemisphere of the IPC, along the ‘controlling vector’ of the Power dimension (as opposed to the ‘submissive vector or pole’).

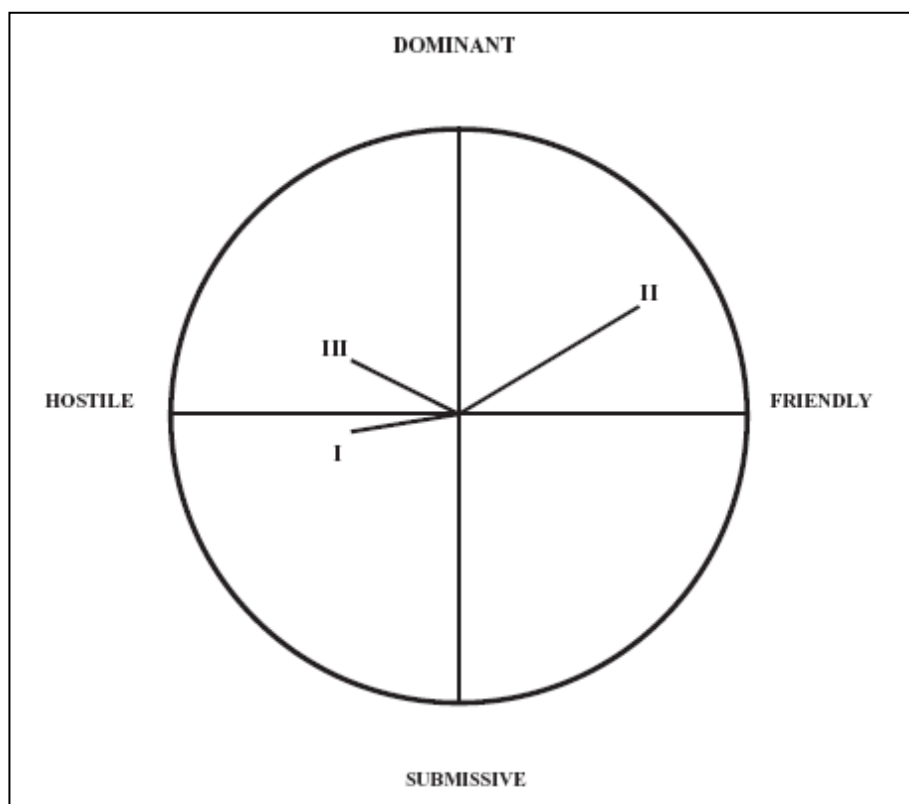


Figure 5. Hmel and Pincus' *Projection of Extracted Factors onto Interpersonal Circumplex*

Reprinted with permission, from Hmel, B. A. and A. L. Pincus, "The Meaning of Autonomy: On and Beyond the Interpersonal Circumplex," *Journal of Personality* 70(3): 277-310, Copyright (2002) Wiley-Blackwell Publishing.

2.6 TECHNOLOGY ACCEPTANCE MODEL AND HYPOTHESES

These sections will first overview the Technology Acceptance Model (TAM), reviewing first the Theory of Reasoned Action (TRA), which provides much of the basis for the TAM. After an initial discussion of Perceived Usefulness and Perceived Ease of Use, more detailed discussions of the external variables that load on PU and/or PEU will follow; included in the respective discussions of the external variable will be their relationships to the personality theories, most importantly, the Interpersonal Circumplex (IPC) and the related hypotheses. Following the presentation of the hypotheses pertaining to the external variables, I will return to the major variables of the TAM – Perceived Usefulness (PU), Perceived Ease of Use (PEU), and Behavioral Intention to Use (BI) – and present the final hypotheses.

2.6.1 Theory of Reasoned Action

For his dissertation work, Fred Davis adapted the Theory of Reasoned Action (Ajzen et al. 1980; Fishbein et al. 1975) to comply more specifically with computer usage

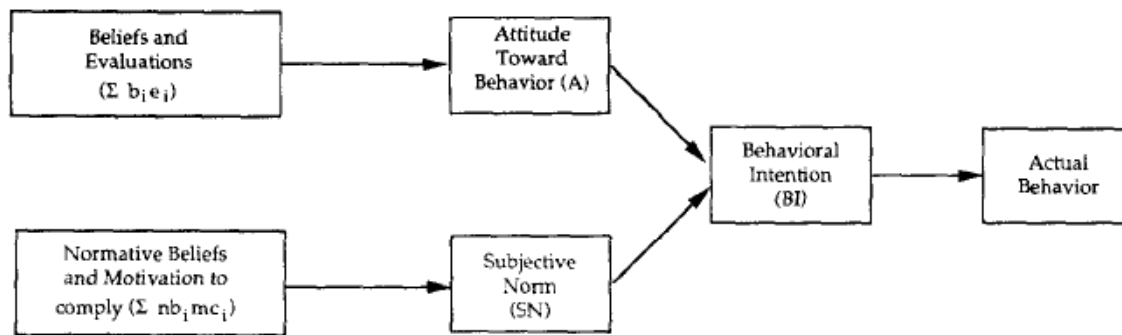


Figure 6. Fishbein and Ajzen's Theory of Reasoned Action (TRA).

Fishbein, M. and I. Ajzen (1975) and Ajzen, I. and M. Fishbein (1980)

behavior. (See Figure 6.) Founded on social psychology, TRA submits that one's behavioral intention (BI) to perform a behavior is a function of one's attitude (A) and subjective norm (SN), regarding the behavior in question.

$$BI = A + SN$$

Davis, Bagozzi, and Warshaw. (Davis et al. 1989) point out that *Attitude Toward Behavior* (A) is the “individual’s positive and negative feelings (evaluative affect) about performing the target behavior” (citing (Fishbein et al. 1975) p. 216); *Subjective Norm* (SN) concerns “the person’s perception that most people who are important to him think he should not perform the behavior in question” (Fishbein et al. 1975) p. 302). These subjective attitudes, feelings, and perceptions are the very influencers (or dispositions to be influenced) that I seek to tap with the ICL.

2.6.2 The Technology Acceptance Model (TAM)

The Technology Acceptance Model (TAM) developed by Davis (Davis 1989) provides the core template for much technology acceptance theory. According to the Technology Acceptance Model the primary factors of Perceived Usefulness (PU) and Perceived Ease of Use (PEU) drive the user’s Attitude to Using (A) and consequently, his/her Behavioral Intention (BI) to use the technology. TAM has been widely accepted for its parsimony and explanatory power. (See Figure 7.) A number studies confirm TAM’s ability to explain IT-user utilization variance (Adams et al. 1992; Mathieson 1991; Venkatesh 2000; Venkatesh et al. 1996).

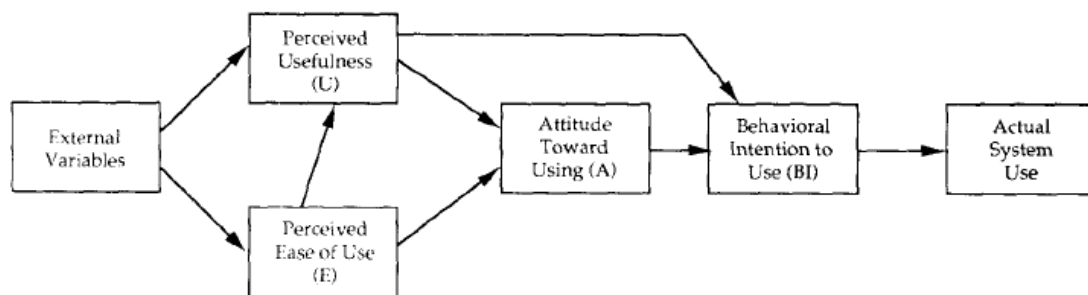


Figure 7. Davis' *Technology Acceptance Model*

Reprinted by permission, Davis, Bagozzi, and Warshaw, 1989, User Acceptance of Computer Technology: A comparison of two theoretical models, *Management Science*, v 35, no 8, August, 1989, the Institute for Operations Research and the Management Sciences, 7240 Parkway Drive, Suite 310, Hanover, Maryland 21076 USA..

2.6.3 Perceived Usefulness

Perceived Usefulness (PU) reflects “the degree to which a person believes that using a particular system would enhance his or her job performance” (Davis 1989) (p. 320). While PU, along with PEU, is significantly correlated to Behavioral Intent to Use, PU is also found to mediate the effect of PEU on usage (Davis 1989). Of significance, system usage is more strongly correlated to PU than PEU (Davis 1989). This, Davis (Davis 1989) reflects, makes sense: “users are driven to adopt an application primarily because of the functions it performs ... and secondarily for how easy or hard it is to get the system to perform those functions” (p. 333). It is the intent of this study to learn if one’s interpersonal traits influence one’s evaluations of a system’s usefulness. If such influences exist, managers and systems analyst design specialists should be cognizant of this bias. Is the system as useful as some report it is, or is it as useless as others suggest? Either bias, unrecognized, can result in unfavorable system design and implementation consequences.

2.6.4 Perceived Ease of Use

Perceived Ease of Use reflects “the degree to which a person believes that using a particular system would be free of effort” (Davis 1989) (p. 320). In a follow-up to his 1996 study (Venkatesh et al. 1996) on antecedents to PEU (computer self-efficacy and objective usability), Venkatash (Venkatesh 2000) expands on the determinants of perceived ease of use: in a longitudinal study, Venkatash tests the effects that training and time has on external “anchor” variables and “adjustments.” At each interval – post training, one month, and three months – “the effects of all proposed determinants of perceived ease of use ... were fully mediated (by perceived ease of use) and no direct effects were observed on intention;” further, he found that PEU had a direct effect and indirect effect (via PU) at each interval. (p. 355) After initial training (T1), Venkatesh found that the proposed anchors explained 40% of the variance of PEU. After three months of experience, the variance explained in PEU was up to 60%. The variance in behavioral intention (BI) remained a fairly consistent 35%. This finding, notes Venkatesh (Venkatesh 2000), explains twice as much variance in PEU as was previously explained

in the 1996 model (Venkatesh et al. 1996). Venkatesh (Venkatesh 2000) summarizes: “The findings suggest that initial drivers of system specific perceived ease of use are largely *individual difference* [italics added] variables and situational characteristics, whose effects become stronger with experience” (p. 357). It is the “individual difference variables” that influence, such evaluations as perceived ease of use, that I seek to identify.

Venkatesh and Davis (Venkatesh et al. 1996) found that an individual’s sense of computer self-efficacy (CSE) can be a significant determinant of systems perceived ease of use.

2.6.5 Computer Self-efficacy (CSE)

Computer self-efficacy is “a judgment of one’s capabilities to use a computer” (Compeau et al. 1995) (p. 192). After having reviewed twenty years of social psychology and self-efficacy, Compeau and Higgins (Compeau et al. 1995) conclude that “all of the studies argue the need for further research to explore fully the role of self-efficacy in computing behavior” (p. 190). Venkatesh and Davis (Venkatesh et al. 1996) found that an individual’s sense of computer self-efficacy (CSE) can be a significant determinant of systems perceived ease use – even before hands-on experience. The highly related construct self-efficacy has been found by Locke, Frederick, Lee, and Bobko (Locke et al. 1984) to still exert significant influence - even after the key determinant of past-performance – has been partialled out. In TAM research, however, the initial effect of one’s sense of CSE appears to abate after direct experience over time (Venkatesh et al. 1996).

Self-efficacy influences response behaviors, effort, and persistence (Bandura 1977) (Bandura et al. 1977). Bandura writes

The strength of people’s convictions in their own effectiveness is likely to affect whether they will even try to cope with given situations. At this initial level, perceived self-efficacy influences choice of behavioral settings. People fear and tend to avoid threatening situations they believe exceed their coping skills, whereas they get involved in activities and behave assuredly when they judge themselves capable of handling situations that would otherwise be intimidating.

Not only can *perceived* [italics added] self-efficacy have directive influence on choice of activities and settings, but through expectations of eventual success, it can affect coping efforts on they are initiated. Efficacy expectations determine how much effort people will expend and how long they will persist in the face of obstacles and aversive experiences. The stronger the perceived self-efficacy, the more active the efforts” (Bandura 1977) (p. 194).

Thus, as Bandura (Bandura 1977) points out, the influence of self-efficacy is not simply an issue of self-efficacy itself but of one’s *perception* of their own self-efficacy: “The strength of people’s convictions in their own effectiveness ... the stronger the perceived self-efficacy, the more active the efforts” (p.194). Further, this conviction or strength of perception may be affected by one’s emotions and anxiety. Emotional, stress, and anxiety responses (Bandura 1977) also effect self-efficacy expectations, in turn effecting performance (Bandura et al. 1977).

Emotional arousal can also influence efficacy expectations in threatening situations. People rely partly upon their state of physiological arousal in judging their anxiety and vulnerability to stress. Because high arousal usually debilitates performance, individuals are apt to consider themselves more able when they are not beset by aversive arousal then when they are tense and viscerally agitated (Bandura et al. 1977) (p. 126).

Bandura et al. (Bandura et al. 1977) also note that in addition to exacerbating one’s emotional arousal, *anxiety* stokes itself through ‘anticipatory self-arousal’ (p. 127). Thus, Compeau and Higgins (Compeau et al. 1995) more complete definition of Computer Self-Efficacy refers to

a judgment of one’s capabilities to use a computer. It is not concerned with what one has done in the past, but rather with judgments of what could be done in the future. Moreover, it does refer to simple component subskills, like formatting diskettes or entering formulas in a spreadsheet. Rather, it incorporates judgments of the ability to apply those skills to broader tasks (p. 192).

Relationships between occupational preferences and feelings of self-efficacy, and occupation preferences and IPC traits, suggest that the IPC may be used to indicate those who would be high in computer self-efficacy and those who would be low. Holland’s

occupation type scale (Holland 1985) categorizes individuals for their personality disposition to one of the following five occupational types (RIASEC): Realistic, Investigative, Artistic, Social, Enterprising, and Conventional. Self-efficacy is found to be significantly correlated to occupational preference (Betz et al. 1996; Tracey 1997). Per Holland's RIASEC scale, Realistic types are mechanically oriented and, generally, score low interest in arts and people oriented jobs. Belando and Winer, (Bellando et al. 1985) found that Realistic types have a tendency to enroll more in more math courses ($r=.25$, $p<.06$) and computer courses ($r=.38$, $p<.01$). As far as sex differences, men tend to score higher on items closer to the "Things pole" such as Electrical and Technical, Data Inspection, Manual Labor, and Construction (Tracey 1997).

Schneider and Ryan (Schneider et al. 1996) found the RIASEC traits positively correlated to the Interpersonal Circumplex traits as follows:

Realistic:	arrogant/calculating (BC), cold/hostile (DE), aloof/introverted (FG);
Conventional:	cold/hostile (DE);
Social:	unassuming/ingenuous (JK), warm/friendly (LM), gregarious/extroverted (NO)
Enterprising:	gregarious/extroverted (NO), ambitious/dominant (PA)

The Broughton, Trapnell et al. (Broughton et al. 1991) pre-Internet study on the IPC and occupational preferences (described above in the RIASEC section, Table 2) also surfaced findings that support Schneider and Ryan (Schneider et al. 1996).

Holland's RIASEC has also been shown to have correspondence with the Five Factor Model (FFM) (Costa Jr. et al. 1984b; Gottfredson et al. 1993; Saucier 1992; Schinka et al. 1997; Schmidt et al. 1999) The dimensions of the FFM are *Neurotic*, *Extroverted*, *Openness to Experience*, *Agreeableness*, and *Conscientiousness* (Costa Jr. et al. 1991; McCrae et al. 1987). The RIASEC Social and Enterprising interests correlates to the NEO *Extroverted*; and the RIASEC Investigative and Artistic interests correlates to the FFM *Openness* (Costa Jr. et al. 1984b; Gottfredson et al. 1993). Schinka et al. (Schinka et al. 1997) found that the *Openness* also correlated to Enterprising (in addition to Investigative and Artistic). (Costa et al. (Costa Jr. et al. 1984a) suggested that the 'openness,' confidence, and enthusiasm of extroverts encourages them to endorse

occupational items of all kinds; whereas ‘closed’ individuals have only conventional interests).²⁰

In consideration that (1) the findings that RIASEC identified career preferences are consistent with individuals’ sense of self-efficacy (Betz et al. 1996; Tracey 1997) and that (2) the RIASEC *Things* vs. *People* dimension (Prediger 1982) is consistent with the IPC Communal (Affiliation) dimension, but (3) yielding to the matter that the FFM dimension of Conscientious has been found to correlate to the IPC warm/friendly octant (LM) I make the following hypotheses concerning self-efficacy:

Hypothesis 1a The participants’ level of communality will be negatively correlated to computer self-efficacy (CSE).

Which octant(s) will report the **highest average computer self-efficacy**? In the Hmel and Pincus (Hmel et al. 2002) study of autonomy, Factor I, “*Depressogenic Vulnerability*” was located in the cold/hostile octant (DE) (just into the quadrant 2 side). Although Hmel and Pincus declined to label it autonomy, the *depressogenic vulnerability* factor did have high loadings on need for control, independence, solicitude, and perfectionism. Factor III, *agentic separation*, is, however, associated with autonomy and conscientiousness; it is located at the border of IPC arrogant/calculating (BC) octant and three degrees from cold/hostile (DE). So which would report the highest average computer self-efficacy DE, or FG? Here I defer to Holland’s RIASEC model, those on the Realistic dimension had the lowest computer anxiety (Bellando et al. 1985); and the Realistic dimension most correlates to the aloof/introverted (FG) factor. I *anticipate*²¹ that octant aloof/introverted (FG) will have the highest computer self-efficacy and that octant cold/hostile (DE) will have the second highest.

Which octant(s) will have the **lowest average computer self-efficacy**? As Bellando and Winer (Bellando et al. 1985) noted with regards to Holland’s RIASEC preferred occupational scale, the Artistic and Social types reported the highest computer anxiety. Schneider and Ryan (Schneider et al. 1996) found that the Social dimension of the RIASEC correlated to the three Affiliative octants of the IPC: unassuming/ingenuous (JK), warm/friendly (LM), and gregarious/extroverted (NO). The gregarious/extroverted

²⁰ As an aside, NEO Agreeableness is positively related to FFM social and artistic in men (Ibid.).

²¹ While I do articulate *anticipated* differences, I am not advancing them, specifically, as hypotheses.

(NO) octant scored the most sociable of the interpersonal behaviors (Gifford et al. 1987); while the warm/friendly octant (LM) is most immediately along the IPC dimension of Friendliness (Communal), the Friendly dimension has been found to be most correlated to the FFM dimension of Conscientious (Schmidt et al. 1999) (Ansell et al. 2004). I *anticipate* that octant gregarious-extroverted (NO) will report the lowest average level of computer self-efficacy and that octant unassuming/ingenuous (JK) will report the second lowest average level of computer self-efficacy. I, therefore, posit the following hypotheses:

Hypothesis 1b Octant aloof/introverted (FG) and octant cold/hostile (DE) will report higher average computer self-efficacy than octants gregarious-extroverted (NO) and unassuming/ingenuous (JK).

In most general terms, 1a and 1b hypothesize the following: those scoring along the acommunal pole (as opposed to scoring positively along the communal pole) – especially those in the unaffiliative-submissive quadrant II – will, on average, respond more positively to computer self-efficacy (CSE) questions.

2.6.6 Computer Anxiety (CA)

While the research on traits and computer anxiety is mixed (Cambre et al. 1985; Kernan et al. 1990; McPherson 1998), research exists that correlates computer anxiety to individual attitudes (Chen et al. 1992; Farina et al. 1991; Igbaria et al. 1989), vocations (Bellando et al. 1985), self-efficacy and computer self-efficacy (Compeau et al. 1995; Deane et al. 1995; Kinzie et al. 1994), as well as traits (*vis-à-vis* the NEO-Five Factor Inventory) (Anthony et al. 2000; Korukonda 2007), and trait anxiety (Farina et al. 1991).

2.6.6.1 Computer Anxiety and the Five-Factor Model

As per the NEO-Five Factor Inventory, Korukonda (Korukonda 2007) found Neuroticism and Conscientiousness to be statistically significant in explaining computer anxiety. By running a regression analysis without including the observations in the middle range, Korukonda found (1) even greater explanatory power and (2) that

Agreeableness also exhibited statistically significant difference when comparing high computer anxiety to low computer anxiety groups: high neuroticism, low openness, and low agreeableness are associated with significantly higher computer anxiety.

A number of different efforts have been made to map the NEO Five Factor Inventory to the IPC (Ansell et al. 2004; Markey et al. 2006; McCrae et al. 1989; Schmidt et al. 1999; Trapnell et al. 1990). Ansell and Pincus (Ansell et al. 2004) map all five factors and is generally representative. Combining Korukonda's (Korukonda 2007) findings on the FFM and computer anxiety, along with Ansell and Pincus' (Ansell et al. 2004) work mapping the FFM to the IPC, we have the following (Table 3):

Table 3. Mappings of the Computer Anxiety Correlations to the Five Factor Model, and from the Five Factor Model Correlations to the Interpersonal Circumplex

<u>CA correlations to FFM</u>	<u>Factors of FFM</u>	<u>FFM correlations to IPC</u>
Low Computer Anxiety	High Conscientiousness	(Quadrant 1 area but not NO) Dimension Control (90 degrees) (PA) Assured-Dominant
		Dimension Affiliation (0 degrees) (LM) Warm-Friendly
High Computer Anxiety	High Neuroticism	Quadrant II: Hostile-Submissive (FG) Aloof-Introverted
	Low Openness	Quadrant II: Hostile-Submissive (FG) Aloof-Introverted
	<i>(Conversely, however ... High Openness</i>	<i>Quadrant IV: Friendly-Dominant (NO) Gregarious-Extravert</i>
High Computer Anxiety	Low Agreeableness	Quadrant 1: Hostile-Dominant (DE) Cold-Hostile
	<i>(Conversely, however... High Agreeableness</i>	<i>Quadrant III – Friendly Submissive Warm-Friendly)</i>

2.6.6.2 Computer Anxiety and RIASEC and the IPC

Holland (Holland 1985) proposed an occupational model based on six personality types: Realistic (R), Investigative (I), Artistic (A), Social (S), Enterprising (E), and Conventional (C) (henceforth RIASEC). (Refer to Figure 3, Holland's RIASEC.)

By showing computer anxiety (CA) correlations to career types on the RIASEC, followed by RIASEC occupations type correlations to the IPC, rationale will be developed for related hypotheses. Bellando and Winer (Bellando et al. 1985) found that *Realistic* types enrolled in more math in computer courses, scored less anxiety on the computer science subscale of computer anxiety scale; *Artistic* and *Social* types had negative correlations to computer classes taken and reported more negative attitudes towards computers. Most saliently, *Artistic* and *Social* types reported significantly more computer anxiety than the remaining groups (Enterprising, Conventional, Realistic, Investigative) (Bellando et al. 1985).

Schneider and Ryan (Schneider et al. 1996) found the Things-People dimension of Holland's RIASEC hexagram is parallel to the Communal (Affiliation) dimension of the IPC, thus producing the subsequent RIASEC–IPC trait correlations. The listings below are the computer anxiety (CA) correlations to RIASEC career types, followed by the RIASEC career types correlations to the Interpersonal Circumplex (IPC) octant traits. (See Table 4.)

Table 4. Mappings of the Computer Anxiety Correlations to the RIASEC, and from the RIASEC Correlations to the Interpersonal Circumplex Model

<u>CA correlations to RIASEC</u>	<u>RIASEC</u>	<u>RIASEC correlations to IPC</u>
High Computer Anxiety	Social:	Hemisphere Communal + (NO) gregarious/extroverted + (LM) warm/friendly + (JK) unassuming/ingenuous
High Computer Anxiety	Artistic	-- (HI) submissive
Lower CA than Social & Artistic	Enterprising:	Quadrant IV: Friendly-Dominant + (PA) assured/dominant + (NO) gregarious/extroverted
	Realistic	Hemisphere Acomunal + (BC) arrogant/calculating, + (DE) cold/hostile, + (FG) aloof/introverted;
	Conventional:	+ (DE) cold/hostile;

In light of the above, those in octants BC, DE, FG (of quadrants I and II) are “Things (Technical/Realistic)-People” and should have significantly lower computer anxiety in than the “People-People:” those in octants JK, LM, NO (of quadrants III and IV). (Note that octant unassured/submissive (HI), which lines up along the IPC submissive pole, was not specifically associated with any of the RIASEC career preferences). This contrasts, somewhat with the computer anxiety correlations to the Five Factor Model (FFM) and how the FFM maps to the IPC: that research it would suggest that octants DE and FG would have high computer anxiety. I will defer here to the Bellando and Winer (Bellando et al. 1985) research, correlating Holland’s RIASEC preferred occupational styles to computer anxiety. I, therefore, hypothesize the following:

- Hypothesis 2a** The participants’ level of communality will be positively correlated to general computer anxiety.
- Hypothesis 3a** The participants’ level of communality will be positively correlated to computer anxiety-specific to the computer-based learning system.

Which octant will have the **lowest computer anxiety**? On Holland's RIASEC model, those on the *Realistic* dimension – 'technical' and 'things dimension' – had the lowest computer anxiety (Bellando et al. 1985). The *Realistic* dimension most correlates to the IPC aloof/introverted (FG) factor (Schneider et al. 1996). Interestingly, however, both the Bellando & Winer (Bellando et al. 1985). study and Korukonda (Korukonda 2007) study support the notion that the assured/dominant (PA) octant would have lower computer anxiety: low or lower computer anxiety maps through both the RIASEC (Enterprising) and FFM (Conscientious) to the IPC octant assured/dominant (PA). Deferring to the Bellando and Winer study and acknowledging the support of the Korukonda findings, I anticipate that IPC octant aloof/introverted (FG) will report the lowest average computer anxiety and that octant assured/dominant (PA) will have the second lowest average computer anxiety of the octants.

Which octant(s) will have the **highest computer anxiety**? As per Bellando and Winer (Bellando et al. 1985) study of Holland's RIASEC preferred occupational scale, the *Artistic* and *Social* types reported the highest computer anxiety. Schneider and Ryan (Schneider et al. 1996) found that the *Social* dimension of the RIASEC correlated to the three of the IPC's Affiliative octants: unassuming/ingenuous (JK), warm/friendly (LM), and gregarious/extroverted (NO). The gregarious/extroverted (NO) octant is the polar opposite of aloof/introverted (FG), and gregarious/extroverted (NO) scored the most interpersonal of behaviors (Gifford et al. 1987). I temper these correlations with the finding that the FFM factor Conscientiousness positively correlates with warm/friendly (LM) (Schmidt et al. 1999) and, further, is negatively correlated with external Locus of Control (Hmel et al. 2002). I anticipate that octant gregarious-extraverted (NO) will report the highest average computer anxiety of the octants and that octant unassuming/ingenuous (JK) will average the second highest level of computer anxiety of the octants.

Hypothesis 2b IPC octant aloof/introverted (FG) and octant assured/dominant (PA) will report lower general average computer anxiety than octants gregarious-extraverted (NO) and unassuming/ingenuous (JK).

Hypothesis 3b IPC octant aloof/introverted (FG) and octant assured/dominant (PA) will report lower average computer anxiety-specific to the computer-based learning system, than octants gregarious-extraverted (NO) and unassuming/ingenuous (JK).

In most general terms, 2a, 3A, 2b, and 3B hypothesize the following: those scoring along the Acommunal pole (as opposed to scoring positively along the communal pole) – especially those in the unaffiliative-submissive quadrant II – will, on average, report lower computer anxiety.

2.6.7 Perceived Enjoyment – Satisfaction, Behavioral Beliefs, and Attitudes

The Interpersonal Circumplex (IPC) maps to both models of Affect (or Positive and Negative Affect) (Yik et al. 2004) and the Five Factor Model (Schmidt et al. 1999). These mappings provide theoretical groundwork for these (and subsequent) hypotheses. *Positive Affect* is related to extroversion and sociability, and reflects a person's enthusiasm and pleasurable engagement (Figure 8). *Negative Affect* is related to neuroticism and anxiety, and reflects aversive mood states, experiencing unpleasant events, and unpleasurable engagement (Tellegen 1985; Watson et al. 1984a; Watson et al. 1988).

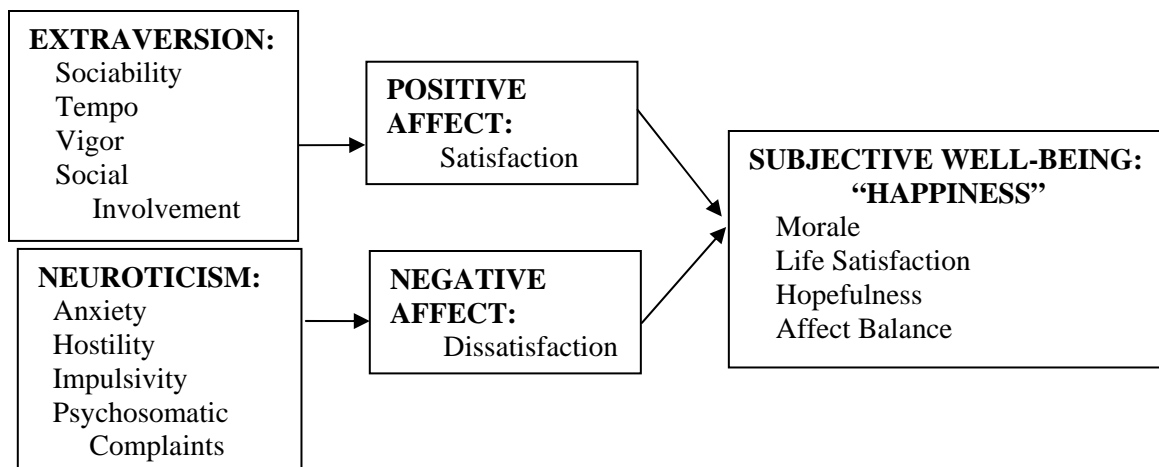


Figure 8. Costa & McCrae's Model of Personality Influences on Positive and Negative Affect on Subjective Well-Being

Reprinted with permission from "Influence of Extroversion and Neuroticism on Subjective Well-Being: Happy and Unhappy People" by Costa Jr., P. T. and R. R. McCrae (1980). *Journal of Personality and Social Psychology* 38(4): 668-678, Copyright (1980) American Psychological Association.

In regards to the IPC mapping to the Five Factor Model (FFM), the IPC *Friendly* dimension and *Friendly* octant map to the FFM factors and *Extroversion*, *Openness to Experience*, and *Agreeableness* (Schmidt et al. 1999). *Extroversion* includes activity, excitement-seeking, and positive emotions (McCrae et al. 1989; Costal Jr. et al. 1991). *Openness* reflects a need for varietal actions and curiosity (McCrae et al. 1985; Costal Jr. et al. 1991). *Agreeableness* reflects altruism and tendermindedness (Costa Jr. et al. 1991), tender-gentle-soft heartedness, kind, tender, charitable, sympathetic, and accommodating (Trapnell et al. 1990). The IPC traits within the affiliative dimension are associated with more ‘positive’ behaviors – the inverse of negativism or pessimism (Kiesler 1983).

Given the theoretical framework of the IPC and the affiliative dimension; the reinforcing theory from both the models of Affect and the FFM, regarding pleasurable experiences, as well as Extroversion, Openness to Experience, and Agreeableness; I, therefore, make the following hypotheses:

- Hypothesis 4a** The participants’ level of communality will be positively related to their reported level of perceived enjoyment using the computer-based learning system.
- Hypothesis 4b** IPC octant gregarious/extraverted (NO) and octant warm/friendly (LM) will report higher average enjoyment using the computer-based learning system than octants aloof/introverted (FG) and cold/hostile (DE).

In most general terms, 4a and 4b hypothesize the following: those scoring positively along the communal pole (as opposed to scoring along the acommunal pole) – especially those in the affiliative-dominant quadrant IV – will, on average, report higher average enjoyment using the CBL system.

2.6.8 Objective Usability – Perceived System Performance (PSP)

Liu and Ma (Liu et al. 2006) extended Davis' TAM to include *Perceived System Performance*. In their words, "Perceived system performance (PSP) refers to the degree to which a person believes that a system is reliable and responsive during a normal course of operations" (p. 50). In the Liu and Ma study, "PSP explained 46% of the variance in PEU, and 56% of the variance in (behavioral intention to use) with PU as a covariate" (p. 55). PSP's importance should be highlighted. Liu and Ma noted that when PSP was absent, PEU was significantly correlated to BI. When PSP was acting as a covariate, however, the correlation between PEU and BI disappeared, "implying that BI is independent of PEU given PSP;" moreover, "PSP is a more direct predictor of BI than PEU" (p. 55).

According to Yik et al.'s (Yik et al. 2004) *Affect Circumplex* (as opposed the Interpersonal Circumplex, IPC), the location of Negative Affect (NA) dimension of *Displeasure* lines up with the IPC's Hostile dimension and Cold-Quarrelsome octant (DE). Watson and Clark (Watson et al. 1984a) report that individuals high in NA – in contrast to those low in NA – dwell upon and magnify mistakes, frustrations, and disappointments; they are also associated with having low self-esteem. In a study of NA group differences, high NA subjects reported themselves as being more rebellious/distrustful, self-effacing/masochistic, and aggressive/sadistic (Altrocchi et al. 1960).

Noted earlier, the IPC dimension of Friendliness and the octant warm/friendly map to the FFM factor *Openness* (Schmidt et al. 1999). In essence, FFM *Openness* may be most easily considered 'openness to experience' (McCrae et al. 1997), reflecting curiosity. Trapnell and Wiggins (1990) note that *Openness* has been variously interpreted as "inquiring intellect (Fiske, 1949), culture (Tupes & Christal, 1961), intellect (Digman & Teakemoto-Chock, 1981; Peabody & Goldberg, 1989), intellectance (Hogan, 1983), and openness to experience (McCrae & Costa, 1985)" (Trapnell et al. 1990) (p. 782). Trapnell and Wiggins (1990) analysis cautions that for the general FFM instrument, *Openness* captures both cultural/aesthetic aspects of intellectuality and scholastic ability; as for the IASR-B5 instrument, they determined, *openness* reflects the cultural/aesthetic (Trapnell et al. 1990). Their analysis yielded the following loadings for FFM *Openness to*

Experience (p. 785): Philosophical (.66), Abstract Thinking (.64), Imaginative (.63), Inquisitive (.57), Reflective (.51), Literary (.49), Questioning (.49), Individualistic (.42). Ansell and Pincus (Ansell et al. 2004) correlated Openness to Extroverted octant (45degrees).

When elucidating Leary's (Leary 1957) original 1957 interpersonal circumplex, Carson (Carson 1969) explained that individuals high in Friendly-Dominance (quadrant IV) "would be particularly likely to give relationship partners the benefit of the doubt in potentially problematic situations" ((Carson 1969) citing (Leary 1957) p. 614). Interpersonal adjectives that Wiggins associates with octant JK are modesty, unargumentative, and trusting; with LM: warm, appreciative, and cooperative; and with NO, approachable, congenial, and enthusiastic (Wiggins 1979). Likewise, Kiesler (Kiesler 1983) labels a slightly narrower band of vectors around the Affiliative dimension as Trusting, Warm, Friendly, and Sociable.

The previous paragraph illustrates how traits along the IPC Affiliative dimension are associated with traits more cooperative and exhibiting more 'positive' behaviors – that is, the inverse of obstructionism and hostility. Earlier paragraphs note the correspondences of Interpersonal Circumplex (IPC) octants to dimensions on both the Affect Model and FFM. The correspondences noted above suggest how IPC octants in the Communal (or Affiliative) hemisphere will respond more positively and openly to assessment and prediction questions.

Hypothesis 5a The participants' level of communality will be positively related to their reported level of perceived system performance of the computer-based learning system.

Hypothesis 5b IPC octant warm/friendly (LM) and octant gregarious/introverted (NO) will report higher average perceived system performance of the computer-based learning system reliability than octants cold/hostile (DE) and aloof/introverted (FG).

In most general terms, 5a and 5b hypothesize the following: those scoring positively along the communal pole (as opposed to scoring along the Acommunal pole) – especially those in the Affiliative-Dominant Quadrant IV – will, on average, report higher perceived system performance.

2.6.9 Trust

Mayer, Davis, and Schoorman's (Mayer et al. 1995) oft cited definition suggests trust as being a psychologically state, namely, a *willingness to be vulnerable*. I will first elaborate on Mayer et al.'s trust principle *willingness to be vulnerable*. This discussion on *willingness to be vulnerable* will then segue into vulnerability in the virtual environment and trust in technology antecedents to the TAM *vis-à-vis* individuals. This will then be followed by a discussion on *disposition to trust*. We begin first with Mayer, Davis, and Schoorman's more popular definition of trust in management literature and its underlying principle, *willingness to be vulnerable*.

Willingness to Be Vulnerable. Mayer, Davis, and Schoorman (Mayer et al. 1995) succinctly describe trust as the “willingness to be vulnerable to another party” (p. 726). In management literature, it is their more formal definition that is frequently referenced:

(Trust) is the willingness of one party to be vulnerable to the actions of another party based on the expectation that the other will perform a particular action important to the trustor, irrespective of the ability to monitor or control that other party... Trust is not taking risk per se, but the willingness to take risks. (Mayer, Davis, & Schoorman, 1995) (p. 712).

Mayer et al. (Mayer et al. 1995) describe an individual's engagement in trusting behavior as a function of the level of trust that they have and the level of perceived risk that is involved. Whichever is greater – the level of trust or the perceived level of risk – is what influences the choice of behavior.

Trust as a Psychological State. Rousseau, Sitkin, Burt, and Camerer (Rousseau et al. 1998) reviewed studies of trust across a broad range of disciplines, “from across the psychology/organizational behavior to strategy/economics.” They determined that “confident expectations and a willingness to be vulnerable are critical components of all definitions of trust reflected in the articles” (p.394). Further, they identify the definition of Mayer et al. (1995) – the “willingness to be vulnerable” – as being most referenced in the literature. From their cross-disciplinary review of literature, Rousseau et al. propose the following as the most universal representative of the different operationalizations of trust:

Trust is a *psychological state* [italics added] compromising the intention to accept vulnerability based upon positive expectations of the intentions or behaviors of another (Rousseau et al., 1998) (p. 395)

The next section discusses Mayer et al.'s definition of trust; the relevance of their definition will follow immediately. The Cummings et al. definition will be discussed in a subsequent section.

2.6.10 The 'Willingness To Be Vulnerable' (Mayer et al. 1995)

Research on *Disposition to Trust*. Morton Deutsch, pioneering trust scholar, studied *disposition to trust* and identified a dynamic that he termed *cognitive consistency* - expecting others to do unto you, what you would do unto them (Deutsch 1958; Deutsch 1960). In an experimental trust game, in which participants were respectively measured on levels of trusting and trustworthiness towards an unknown other, Deutsch found that throughout their play, participants were either both consistently trusting and trustworthy, or they were consistently untrusting and untrustworthy. In effect, those who were trusting of their anonymous counterpart were likewise trustworthy towards them; conversely, those who were untrusting, exhibited untrustworthy behavior towards their anonymous counterparts.

One's *disposition to trust* is a function of his or her developmental experiences, cultural background, and personality traits. Mayer, Davis, and Schoorman (Mayer et al. 1995) identified three separate, significant factors contributing to trust – the trustor's belief in the trustee's ability, benevolence, and integrity. The trustor's belief is mediated by his or her *disposition to trust*. Noteworthy is that one's *disposition to trust* is in some measure dependent upon one's interpersonal traits – and “interpersonal traits” are perceived as being stable (Rotter 1967; Rotter 1971; Rotter 1991); therefore, to some degree, one's disposition to trust is also relatively stable.

2.6.11 Trust in Technology and the TAM

Davis' (Davis 1989) Technology Acceptance Model (TAM) includes the factors *perceived ease of use* and *perceived usefulness*. What personal or psychological factors lie behind and/or inform individuals' *perceptions* that form these two constructs remains *unexplicated*. Pavlou (Pavlou 2003) proposes integrating trust and *perceived risk* into the TAM model, not as an outcome but as a mediating variable between extraneous variables 'satisfaction with past transactions' and 'reputation' and the TAM variables PEU, PU, plus Perceived Risk. (p. 118) Pavlou finds that a consumer's trust in an e-commerce site affects his *perception* of risk, *perception* of usefulness, and his *perception* of usefulness, in addition to influencing his intention to transact commerce. Pavlou focuses on the user's current state of trust; I extend his model by proposing that user traits and correlated *disposition to trust* influence the users' reported perceptions of technology and related trust in it.

In sum, trust or disposition to trust may be seen as a psychologically-based *willingness to be vulnerable* based on the expectations of others (Mayer et al. 1995; Rousseau et al. 1998). In being psychologically-based, *trustiness* (in the other) may be understood – to some degree – as a function of one's personality traits or, more economically, one's dominant personality trait. This *willingness to be vulnerable* based on the expectations of others is also shown to be significantly correlated to one's own trustworthiness; as Deutsch (1960) described it, the product of *cognitive consistency*: expecting others to do unto you, as you would do unto them. In the context of computer-mediated learning, the sense of vulnerability may be accentuated by the novel uncertainty in the virtual environment. Or, to rephrase, the sense of uncertainty may be accentuated by the novel vulnerability of the virtual environment. Pavlou (Pavlou 2003) recognizes this acceptance issue and proposes integrating trust and *perceived risk* into Davis' TAM. Acceding to Pavlou's proposal, one may reason then, that the issue of trust in technology precedes – if not accentuates – the issue **comfort and satisfaction** the computer-mediated environment. Human-computer trust, therefore, is an *a priori* issue. Trust in technology I posit is a function of the same psychologically-based willingness to be vulnerable. As such, it should be correlated to the same psychological personality traits.

Do the two dimensions of Agency and Communality (Control and Affiliation) affect or correspond to trust and, if so, how? There is general consensus that Communal (Affiliation) dimension (Hostile vs. Friendly) corresponds to interpersonal trust and distrust; this is expressed in the literature, as well as depicted on the different interpersonal circumplex models themselves (Carson 1969; Kiesler 1983; Leary 1957; Strong et al. 1986). Trust manifests more towards the Friendly pole of Communality (Affiliation), Distrust with the Hostile pole (to the West). Gurtman (Gurtman 1992b) and Gain et al. (Gains Jr. et al. 1997) analyses indicated that interpersonal trust is better predicted by Agency (Control) and Communality (Affiliation).²² Therefore, because individuals in the Communal (Affiliative) hemisphere are indicated to have high trust, and individuals in the Friendly-Submissive (Communal-unagentic) quadrant are indicated to have the highest trust, I posit the following hypotheses about the participants' trusting intentions *as a subjective probability of depending* on the CBL in the future.

Hypothesis 6a The participants' level of communality will be positively related to their reported level of trusting intentions to use the computer-based learning system in the future.

Of the octants – moreover, of the octants along the Communal (Affiliative) dimension – which octants exhibit the **highest trusting intention**? Recall that the traits within Octant IV represent composites of Dominance (e.g. assertiveness) and Affiliation. Gurtman (Gurtman 1992b) and Gain et al. (Gains Jr. et al. 1997) analyses indicated that interpersonal trust is better predicted by Agency and Communality (Control and Affiliation). Wiggins' (Wiggins 1979) adjectives describing the vectors within Friendly-Dominant quadrant are warm and appreciative; cooperative and accommodating; approachable and enthusiastic. In contrast, however, other IPC theorists associate the 'K' vector with trust and its opposite 'C' vector with distrust (Kiesler 1983; Leary 1957; Strong et al. 1986; Wiggins 1979). Kiesler (1983) goes so far as to label the 'K' and 'C' vectors Trust and Mistrusting. I anticipate that unassuming/ingenuous (JK) will report the highest trusting intention and that arrogant/calculating (BC) will report the lowest. I, therefore, hypothesize the following:

²² Gurtman (1992) actually used the terms Dominance and Nurturance.

Hypothesis 6b IPC octant unassuming/ingenuous (JK) and octant warm/friendly (LM) will report higher average trusting intention to use the computer-based learning system in the future than octants arrogant/calculating (BC) and cold/hostile (DE).

In most general terms, above I am hypothesizing the following: those scoring positively along the communal pole (as opposed to scoring along the acommunal pole) – especially those in the Affiliative-Dominant Quadrant IV – will, on average, respond more positively to technology trust questions. To test these hypotheses, I will distinguish participants according to their IPC differentiated traits; survey their responses to technology and interpersonal trust questions; and, finally, survey their opinions after using a computer-based learning system.

2.6.12 Perceived Ease of Use (PEU)

Perceived Ease of Use is how much a user believes the system will be free from effort (Davis 1989). Perceived Ease of Use is also a function of individual differences and situational characteristics (Venkatesh 2000). PEU can also be influenced by one's computer self-efficacy (Venkatesh et al. 1996). As outlined above in the Computer Self-Efficacy section, the acommunal-communal (Affiliation: hostile-friendly) dimension of the IPC parallels that of the things-people dimension of the RIASEC preferred occupations scale (Schneider et al. 1996). The "things pole" represent such trades as electrical, technical, mechanical, and construction (Holland 1966; Tracey 1997). In relationship to the IPC, the things pole corresponds to the acommunal (hostile) pole of the IPC (Schneider et al. 1996). The RIASEC things pole corresponds to the "Realistic" point along the RIASEC preferred occupations hexagon; and Realistic occupation traits correlate with the IPC octants of the acommunal hemisphere: arrogant/calculating (BC), cold/hostile (DE), and aloof/introverted (FG) (Schneider et al. 1996). Consistent with my earlier contention that those scoring along the acommunal vector (and the "things" dimension of the RIASEC) would have higher computer self-efficacy, I present the following hypothesis:

Hypothesis 7a The participants' level of communality will be negatively related to their reported level of perceived ease of use of the computer-based learning system.

Which octant(s) will report the **highest average perceived ease of use**? In the Hmel and Pincus (Hmel et al. 2002) study of autonomy, Factor I, "*Depressogenic Vulnerability*" was located in the cold/hostile octant (DE) (just into the quadrant 2 side). Although Hmel and Pincus declined to label it autonomy, the *depressogenic vulnerability* factor did have high loadings on need for control, independence, solicitude, and perfectionism. Factor III, *agentic separation*, is, however, associated with autonomy and conscientiousness; it is located at the border of IPC arrogant/calculating (BC) octant and three degrees from cold/hostile (DE). So which would report the highest average computer self-efficacy, BC, DE, or FG? Again, as done in the computer self-efficacy section, I defer to Holland's RIASEC model, those on the Realistic dimension had the lowest computer anxiety (Bellando et al. 1985); and the Realistic dimension most correlates to the aloof/introverted (FG) factor. I anticipate that octant aloof/introverted (FG) will report the highest average PEU and that octant cold/hostile (DE) will report the second highest.

Which octant(s) will have the **lowest perceived ease of use**? As Bellando and Winer (Bellando et al. 1985) noted with regards to Holland's RIASEC preferred occupational scale, the Artistic and Social types reported the highest computer anxiety. The RIASEC Social types correlate to the IPC Affiliative octants: unassuming/ingenuous (JK), warm/friendly (LM), and gregarious/extroverted (NO) (Schneider et al. 1996). Of these, the Gregarious/extroverted (NO) octant scored the most sociable of the interpersonal behaviors (Gifford et al. 1987). The warm/friendly octant (LM) is most immediately along the IPC dimension of Friendliness (Communal); this Friendly dimension has been found to be most correlated to the FFM dimension of Conscientious (Ansell et al. 2004; Schmidt et al. 1999). In sum, gregarious/extraverted (NO) and warm/friendly (LM) – reasonably associated with computer anxiety – should experience the lowest average perceived ease of use. Therefore, I hypothesize the following:

Hypothesis 7b: Octant aloof/introverted (FG) and octant cold/hostile (DE) will report higher average perceived ease of use of the computer-based learning system than octants gregarious/extroverted (NO) and warm/friendly (LM).

In most general terms, 7A AND 7B hypothesize the following: those scoring along the acommunal pole (as opposed to scoring positively along the communal pole) – especially those in the Unaffiliative-Submissive Quadrant II – will, on average, respond more positively to perceived ease of use questions..

Perceived Ease of Use has been found to influence Perceived Usefulness (Venkatesh 2000).

2.6.13 Perceived Usefulness (PU)

Perceived Usefulness (PU) is how much one believes that a particular system would enhance their job performance (Davis 1989). According to Mood Model theory, Positive Affect and Negative Affect are highly correlated to optimism and pessimism, as one would predict: PA is positively correlated to optimism and negatively correlated to pessimism; and, NA is negatively correlated to optimism and positively correlated to pessimism (Lucas et al. 1996).

Recalling how the Mood Model maps to the IPC, the right or Communal (Affiliative) hemisphere of the IPC is correlated to the more pleasant affect states; the left or Acommunal (Hostile) hemisphere of the IPC is correlates to the more unpleasant affect states (Larsen et al. 1992; Remington et al. 2000; Yik et al. 2004). Larsen's Circumplex of Emotion (Figure 9) depicts the positive and negative affect states.

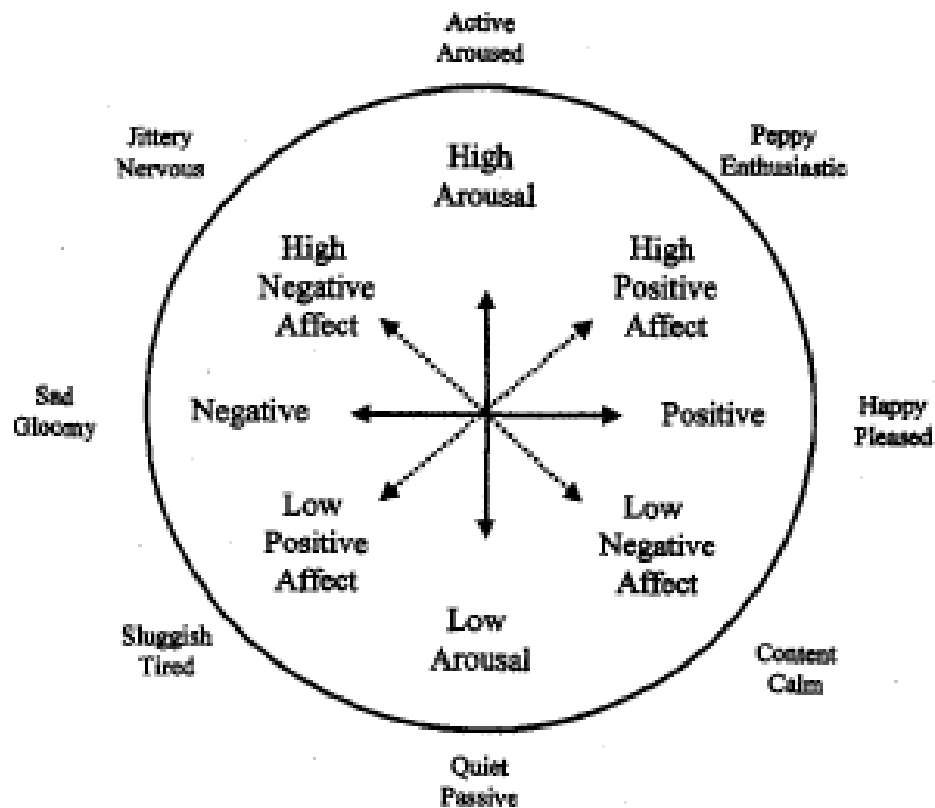


Figure 9. Larsen and Diener Circumplex of Emotion

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Correspondingly, then, one may reason that the left side of the IPC – the acommunal (dis-affiliative) side – correlates to higher pessimism; and the right side of the IPC – the communal (affiliative) side – correlates to higher optimism. I make, therefore, the following hypothesis:

Hypothesis 8a The participants' level of communality will be positively related to their reported level of perceived usefulness of the computer-based learning system.

In Hmel and Pincus (Hmel et al. 2002) study of autonomy, the Five Factor Model (FFM), and the Interpersonal Circumplex Model (IPC), they identified a *Self-governance* Factor II that they located centrally (42 degrees) in the IPC quadrant IV, Communal-Agentic (Friendly-Dominance), placing, more specifically, in the IPC octant gregarious/extravert (NO). This Factor II, *Self-governance*, is positively associated with the FFM factors, Agreeableness, Conscientiousness, Extraversion, and Openness (Hmel et al. 2002); this association is consistent with other studies (1) correlating the FFM factor Agreeableness with the IPC Communal (Friendly) dimension (and warm/friendly octant (LM)), and (2) correlating the FFM factor Extraversion with the IPC Agency (Dominance) dimension (as well as octant gregarious/extravert (NO) and assured/dominant (PA)). Additionally, Factor II, *Self-governance*, is positively associated with FFM factors Openness and Conscientiousness, suggesting that the IPC quadrant IV (Friendly-Dominant) octants are more open to new ideas – will reconsider old ideas – and are more open to expert advice (Hmel et al. 2002).

As noted above, Positive Affect is positively correlated to optimism (Lucas et al. 1996). High Positive Affect corresponds to Extraverted, which characterizes the IPC quadrant IV, Communal-Agentic (Friendly-Dominant). Given that Positive Affect is negatively correlated to pessimism, Low Positive Affect correlates to higher pessimism. Low Positive Affect maps to quadrant II, Acommunal-Unagentic (Hostile-Submissive). In contrast, Negative Affect is positively correlated to pessimism (Lucas et al. 1996); therefore, High Negative Affect (NA) correlates to high pessimism. According to Yik et al. (Yik et al. 2004; Yik et al. 1999), NA is located in the circumplex quadrant I. Recall also that NA is associated with the FFM factor Neuroticism (Ansell et al. 2004; Costa Jr. et al. 1980; McCrae et al. 1991; Watson et al. 1992). Neuroticism, while associated with the acommunal (Hostile) dimension, has been determined to be located on the acommunal side of the octant unassured/submissive (HI) (Ansell et al. 2004), thus placing Neuroticism in IPC quadrant II; suggesting that High NA, would be located there, as well.

Again, as noted above, Positive Affect is positively correlated to optimism (Lucas et al. 1996). High PA also corresponds to Extraversion, which characterizes the IPC octant gregarious/extroverted (NO). In their study, extracting three autonomous factors,

Hmel and Pincus (Hmel et al. 2002) identified a *Self-governance* factor (II) as being most directly located in octant gregarious/extraverted (NO) (at 42 degrees). Moreover, this *Self-governance* factor (II) is significantly correlated with the FFM factors of Openness and Conscientiousness suggesting that IPC octant gregarious/extraverted (NO) is most open to new ideas and expert advice, and (NO) will reconsider old ideas (Hmel et al. 2002).

Negative Affect (NA) is positively correlated to pessimism (Lucas et al. 1996). NA is positively correlated to the FFM factor Neuroticism (Ansell et al. 2004; Costa Jr. et al. 1980; McCrae et al. 1991; Watson et al. 1992). Neuroticism is found to be correlated with the acommunal (hostile) side of IPC octant unassured/submissive (HI) (Ansell et al. 2004), suggesting that High NA, would be associated with unassured/submissive (HI), and, to a degree, aloof/introverted (FG), as well.²³

Hypothesis 8b Octant gregarious-extroverted (NO) will report the higher average perceived usefulness of the computer-based learning system than octants unassured/submissive (HI) and aloof/introverted (FG).

In most general terms, 8A AND 8B hypothesize the following: those scoring positively along the communal pole (as opposed to scoring along the acommunal pole) – especially those in the Affiliative-Dominant Quadrant IV – will, on average, respond more positively to perceived usefulness questions.

While PU, along with PEU, is significantly correlated to Behavioral Intent to Use, PU is also found to mediate the effect of PEU on usage (Davis 1989).

2.6.14 Behavioral Intention to Use the CBL in the Future

The conundrum(s) here is (are) the following: (1) Would those low on the Communal dimension (that is, scoring along acommunal vector), who correspond to being RIASEC *Realistic* “things-persons,” report a higher behavioral intention to use the CBL in the future – despite their simultaneous correspondence to pessimism (as per the Mood Model and negative affect)? (2) Similarly, how would those high on the

²³ See M. Yik and J. Russell’s (2004) three dimensions space IAS Circumplex and 12-PACS (Affect) Circumplex in the appendix.

Communal dimension, who prefer socially-oriented occupations – yet correspond to *Agreeableness* and *Openness* (of the FFM) – report their behavioral intent to use the CBL? One of the overarching themes of this research is that those who are low along the Communal dimension (that is, acommunal) will have a greater self-efficacy, lower anxiety, and higher affinity for technology, and, thus, *in general*, will report more positively about technology use (they may, however, be critical about technology than the communals). Therefore, in the aggregate along the Communal dimension, I anticipate that those who score low in communality (that is along the acommunal vector) will report a higher behavioral intention use the CBL technology in the future.

Hypothesis 9a The participants' level of communality will be negatively related to their reported level of behavioral intention to use the computer-based learning system in the future.

Wiggin's (Wiggins 1979) approach to IPC research includes a *Taxonomy of Interpersonal Traits*. Among the other adjectives, Wiggins characterizes those within the Gregarious-Extraverted (NO) octant as *friendly*, *neighborly*, *approachable*, and *outgoing*. Which octant(s) will report the **higher behavioral intention** to use the CBL in the future?

As noted earlier, the following octants correspond to the *Realistic* dimension of the RIASEC preferred occupations scale: arrogant/calculating (BC), cold/hostile (DE), aloof/introverted (FG) (Schneider et al. 1996). As "*Realistics*," these individuals prefer occupations and tasks that involve working with 'things' and objects (e.g. technical, mechanical activities, machinery, etc.) (Holland et al. 1969; Schneider et al. 1996). As well, it was found that those on the *Realistic* dimension had the lowest computer anxiety (Bellando et al. 1985). Of these three octants, aloof/introverted (FG) is most correlated to the *Realistic* dimension (Schneider et al. 1996). As such and for additional rationales, for previous hypotheses I have reasoned that octant aloof/introverted (FG) would have the higher computer self-efficacy, the lower computer anxiety, and the higher perceived ease of use of the octants. Consistent with this, I anticipate that octant aloof/introverted (FG) will report the highest behavioral intent to use the CBL in the future.

While octants cold/hostile (DE) and arrogant/calculating (BC) are reasonable candidates for reporting the second highest behavioral intent to use the CBL in the future,

an octant from the communal side warrants consideration, as well – the gregarious/extraverted (NO) octant. Quadrant IV is the Friendly-Dominant (Communal-Agentive) quadrant. Wiggins (Wiggins et al. 1988) labels its octants as Assured-Dominant, Gregarious-Extraverted, and Warm-Agreeable – *prima facie*, labels that suggest the uninhibited. Kiesler (Kiesler 1985) characterizes those of the Sociable-Exhibitionistic octant (NO) as *quick to jump into action; outgoing-responsive, eagerly initiating contact* with others (1982 Circle, acts version, Level 1). Leary (Leary 1957), in fact, labeled quadrant IV *Responsible-Hypernormal* (Carson 1969). Additional support comes from the Mood Model, as discussed earlier. We know that Positive Affect is positively correlated to optimism (Lucas et al. 1996). High PA also corresponds to Extraversion (e.g. octant gregarious/extroverted (NO)). Further rationale comes from studies on the Five Factor Model (FFM), which as shown earlier, maps to the IPC. Recalling the Hmel and Pincus (Hmel et al. 2002) study on factors of autonomy, the Five Factor Model (FFM), and the Interpersonal Circumplex Model (IPC), Hmel and Pincus identified a *Self-governance* factor (II) as being most directly located in octant gregarious/extraverted (NO) (at 42 degrees). Moreover, this *Self-governance* factor (II) is significantly correlated with the FFM factors of Openness and Conscientiousness suggesting that IPC octant gregarious/extraverted (NO) is most open to new ideas, will reconsider old ideas, and, most notably for our purposes, is most open to expert advice (Hmel et al. 2002). And this significant correlation to Openness, Conscientiousness and thus extroversion, leads into one of the more qualified arguments that octant NO would report higher *behavior intention* to use the CBL software – enthusiasm. In their study of personality types and vocational interests, Costa and McCrae (Costa Jr. et al. 1984b) found an anomaly in their data: almost all the vocational interests that were available for the participants to check on their survey, were positively related to FFM personality types Enterprising and Openness. This led Costa and McCrae to conclude that “the self-confidence and enthusiasm of *extroverts* [italics added] leads them to endorse items of all kinds on the (Self-Directed Search)” (p. 394). Therefore, arguably, despite the earlier hypothesized low computer self-efficacy and high computer anxiety of the gregarious/extraverts (NO), the gregarious/extraverts may still be so inclined to optimistically, action-mindedly, and enthusiastically endorse *behavioral intention* to use the CBL in the future. Therefore, I

anticipate that gregarious/extravert (NO) will report the second highest behavioral intention to use the CBL in the future.

Which octant will respond with the **lowest behavioral intent** to use the CBL in the future? Octant unassured/submissive (HI) is characterized as being lazy, unindustrious, meek, and unaggressive (Wiggins 1979). Due to its rebellious or uncooperative characteristics, it would be otherwise tempting to include cold/hostile (DE) as an octant with lower behavioral intent; however, due to its aforementioned correspondence to RIASEC *Realistic* dimension and predilection for working with things, that it would report significantly lower BI than the other octants is unconvincing. Therefore, I hypothesize the following:

Hypothesis 9b IPC octant aloof/introverted (FG) and octant gregarious/extraverted (NO) will report higher average behavioral intention to use the computer-based learning system in the future than octant unassured/submissive (HI).

In most general terms, 9A AND 9B hypothesize the following: those scoring positively along the communal pole (as opposed to scoring along the acommunal pole) – especially those in the Affiliative-Dominant Quadrant IV – will, on average, respond more positively to questions about behavioral intention to use the CBL system.

2.7 CHAPTER SUMMARY

Chapter II presented the theoretical framework and hypotheses for my research. The chapter first presented the Interpersonal Circumplex (IPC) as theoretical framework for my research. The IPC is a well-validated personality measure that distinguishes interpersonal traits along the two major personality dimensions of Agency (Dominance/Control) and Commuality (Affiliation/Friendliness). Eight traits are located equidistance around the IPC, depending on their blend of Agency and Commuality. These eight traits, in effect, comprise the treatments of my research. My hypotheses seek to predict user responses to technology acceptance model (TAM) questions/variables based on the user's predominant interpersonal trait. Supporting my theory construction were three complimentary personality models: the Mood Model of Affect, the Five

Factor Model, and RIASEC Preferred Occupations scale. When introducing each of these models, I explained the model and following with the respective model's correspondence to (or mapping to) the other three models (most importantly, their mapping to the IPC). Salient research relating to these models was introduced and integrated to construct theoretical rationales for the subsequent hypotheses. In Chapter III, I present the procedures and methodology used for this research.

CHAPTER III

PROCEDURES AND METHODOLOGY

3.1 OVERVIEW

The purpose of this research is to determine if computer-user responses to IS related questions may be correlated to the user's predominant interpersonal trait. Stated differently, might a computer-user's personality trait relate to how he or she evaluates an information system? How might this be, that one's *interpersonal traits* relate to one's human-to-computer interactions? *Interpersonal* traits reflect how individuals relate to or transact with others; moreover, interpersonal traits reflect one's needs. Does an individual prefer interpersonal interaction and closeness with others or, conversely, does he or she prefer to be more asocial, preferring a distance to others? Or, maybe he or she prefers some inanimate intermediary providing either a barrier to or conduit for interpersonal closeness? *Do one's interpersonal values or needs affect their relationship to technology and usage? Moreover, do one's interpersonal traits or predominant trait influence one's subjectivity in perceiving and evaluating technology?* To guide my study, I adopt Interpersonal Circumplex theory. To measure interpersonal traits, I utilize the Locke's Circumplex Scales for Interpersonal Values Scale (CSIV).

The intent of this study is to determine if responses to computer-use related questions may be correlated to the user's prevailing personality trait, as measured by an interpersonal circumplex scale. There are three stages of this study. In the first stage, students completed an online survey, concerning their general computer anxiety and computer self-efficacy. In the second stage, students used a commercially available, computer-based learning (CBL) system (*SimNettm*). The CBL system is used as part of the students' introductory computer classes. *SimNet* is a multimedia CBL system that instructs, models, and tests students' ability in MS Excel and Access. In the third stage (after using the CBL system for their Excel and Access assignments), students completed a survey, regarding their impressions of the system. The survey includes sections on perceived usefulness, perceived ease of use, perceived enjoyment, perceived system performance, behavioral intention to continue using the system in the future, computer

anxiety about the system, trusting intentions about using the system for future needs. After completing the computer use section, participants completed an abbreviated Circumplex Scales for Interpersonal Values.

3.2 RATIONALE FOR TASK

The task used for this study was a computer-based learning component of an actual college-level, Management Information Systems course. The circumstances parallel an actual introduction of an information system in a business or an IS product into a marketplace. The CBL system was new to the students, and other than having a general awareness of such CBL systems, the particular product was unfamiliar to the students. While this task employed a CBL system, the human-to-computer interaction is generalizeable to introducing and/or utilizing other systems.

3.3 SAMPLE AND SOLICITATION PROCEDURES

Participants were solicited from non-business major undergraduate taking introductory level MIS classes. This sample represents a cross-section of students, exclusive of business majors (as well, engineering majors generally do not take this class). This is a general process being studied; therefore one would expect similar results for students and non-students. The study taps into personality traits and a CBL training experience which would be available to individuals at school, in the workplace, or at home. From an initial survey of three hundred and fifty non-business majors, I expected to attain at least 120 usable participant surveys. I received approximately 274 responses. From the second survey, I received 279. Students were awarded nominal extra credit for their participation.

3.4 EXPERIMENTAL PROCEDURES

Participants in the first stage of the study completed an online survey, which included questions on the following: Computer Anxiety Scales (CAS); Computer Self-efficacy scales (CSE). After completing their use of the computer-based-learning (CBL)

system during the semester, participants completed the second survey two-to-three weeks before the end of the semester. On the second survey students responded to questions on perceived usefulness, perceived ease of use, perceived enjoyment, perceived system performance, behavioral intention to continue using the system in the future, computer anxiety about the system, trusting intentions about using the system for future needs. After completing the computer use section, participants completed an abbreviated Circumplex Scales for Interpersonal Values. All online-survey responses were on a Likert scale (scales: CSIV, 1-10; PEU, PU, & BI, 1-7; all other TAM-related responses were 1-6). Data from both surveys was collected on a survey Web page and routed into an Access database.

3.4.1 Computer-Mediated Learning Task

As part of their introductory computer class, students are required to buy a computer-based learning program. The CBL program is a multimedia, audio-visual program which provides lessons on Microsoft applications (i.e. Access, Excel, Word, Outlook, etc.); for these classes, the students were only assigned the programs on Excel and Access. Each individual specific task-lesson consists of a two-to-four paragraph instruction to be read, an audio-visual model of how to complete the task, and an opportunity for the student to try the task. After completing each lesson in the (teacher constructed) unit, the student is then required to complete a test over the material. The test consists of a series of tasks that the student is requested to complete (i.e. change the font in the cell C4 to bold, using the menu bar.) After completing a test, the student immediately knows his/her score and questions missed. The student may then go to specific tutorials on the material missed. Students may take each test up to three times.

(There are approximately 120 lessons in the Excel module. Each 'unit' constructed by the teacher consists of 15 to 25 individual lessons. The instructor constructs seven to ten units, depending on the complexity of the material (e.g. Excel versus Access) and the time expected of the student to complete the units. Each unit generally requires the student to spend 30 to 40 minutes, and as much as an hour, to proceed through the lesson. Following the lesson, it may take the student another fifteen

to forty minutes to master each subsequent quiz. Quizzes were repeatable. The questions were randomly generated from a test bank and would vary from test to test.)

3.4.2 The Technology

The surveys were web-based and created in HTML and JavaScript, with the backend being an Access database. The surveys were cleaned up and an initial analyses (i.e. partitioning of subjects into IPC octants) was conducted in Excel. Statistical Analyses was conducted in SPSS.

The computer-based learning system, *SimNet[™]*, consists of a CD with lessons and programs, and requires that the user (student) have Internet connection to the vendor's central server. On this central server sits the course units as structured by the instructor. While each student has all the lesson tutorials on his/her CD, it is by connecting to the vendor's central server that the CBL system (that portion which was downloaded to the student's computer) learns how the lessons are organized into each unit. (Each instructor composed his/her own units; however, overall content remained virtually the same.) Indication of completion of each tutorial is transmitted to the central server and registered to that student's account. Likewise, when the student attempts a test, his/her work is recorded and scored at the vendor's central server. (It is from the central server that the instructor then checks and downloads the students' efforts and grades.)

This CBL system is in its second version. Therefore, while the system has had its initially marketed 'beta' version improved upon, it still presents challenges for the user. For instance, students report that their solution to a test question, while actually acceptable (i.e. bolding contents of cell C4 with a shortcut key or right-clicking the mouse, rather than going to Format on the Menu bar) does not receive credit. All students are requested to complete their assignments on the school computers in one of five campus computer labs; this request is made because of connectivity and stability problems that may be encountered when the students attempt working from their home computer or laptop. In itself, the program presents challenges to students; it is not, yet, completely user-friendly. Most, if not all challenges, may be sorted out by persistence or using vendor provided Internet sources, an online helpdesk, and a 1-800 number connecting to a live service representative. While students may solicit their instructors

help when encountering challenges, unless the problem appears universal, the students are most often directed back to the CBL system resources and their own devices. In effect, the CBL system can arouse the anxious and test the self-sufficient.

3.5 MEASUREMENT

3.5.1 The Circumplex Scales of Interpersonal Values version of the IPC

As a very broad overview, the CSIV computes a participant's interpersonal trait scores on the Agency and Communal dimensions (a.k.a. Dominance and Affiliation). Depending on these Agency and Communal scores, one's leading personality trait is then computed onto a single point somewhere onto the circle. This singular point denotes one of eight personality traits. The distance of one's personality point from the center of the circle, reflects the strength of one's interpersonal trait.

In more detail, the CSIV is a thirty-two question survey. A score for each of the respective eight octants or vectors (PA, BC, DE ... NO) is formed from four different questions. Trait scores are normalized: the average score for each of the eight respective vectors is determined; the mean value for each respective vector is then subtracted from the each participant's score for that particular vector; this residual score then becomes the participant's score for that vector; and the average then becomes the origin for that vector. In this study, normalization is done for two purposes: (1) to normalize the data for the sample pool, specific to its demographic (i.e. age and culture); and (2) to normalize the personality data by gender. For this study, I computed different trait averages for males and females; therefore, relative Dominance score, for instance, is computed for each gender. Males may report higher dominant scores than women; and, similarly, females may report lower communal (or hostile) scores than males. The results are relative average trait scores for each gender, ultimately providing a more balanced representation of males and females around the circumplex. After the normalizing the data, the respective trait scores are then calculated, following the prescribed manner.

The CSIV scores are then translated into Agency and Communal (a.k.a. Dominance and Affiliation) scores using the following equation:

$$\begin{aligned}\text{AGENCY} &= pa - hi + (.707 * (bc + no - fg - jk)) \\ \text{COMMUNALITY} &= lm - de + (.707 * (no + jk - fg - bc))\end{aligned}$$

Together, these two CSIV scores may then be translated into the interpersonal point's angular displacement from zero degrees.

$$\text{Angle} = \arctan (\text{AGENCY} / \text{COMMUNAL})$$

Using Excel, first I determined the arctangent (the angle from the x-axis (Communal) to the point coordinates (x_Communal and y_Agency)).

$$\text{Arctangent} = \arctan2 (\text{Communal}, \text{Agency})$$

The arctangent result is the angle given in radians between $-\pi$ and π , excluding $-\pi$ (Microsoft Excel Help). Second, to convert the arctangent score to degrees in Excel, I use the degrees function (or, one can multiply $180/\pi$ by the arctangent).

$$(\pm 180) \text{ Angle}_1 = \text{Degrees} (\text{ATAN2} (\text{Communal}, \text{Agency}))$$

The angular value produced may be either positive or negative, depending on its relation to the x-axis (Communal vector). All these values are processed through an IF-THEN-Else statement to produce degrees 0 through 360. If Angle_1 is greater than or less than 0, then Angle_1 , otherwise (else) add 360 to Angle_1 (which results in positive degrees, zero to three-hundred sixty).

$$(0 \text{ to } 360) \text{ Degrees} = \text{IF} (\text{Angle}_1 \geq 0, \text{Angle}_1, \text{Angle}_1 + 360)$$

Individual participant's results – that is, their angular location – may then be translated onto octants and quadrants within the circumplex circle. (See Appendix C for circumplex octant criteria.). Vector length is determined by summing the squares of Communal and Agency, and then taking square root of that resulting sum. In Excel, the equation is as follows:

$$\text{Vector Length} = \text{SQRT} ((\text{Communal} * \text{Communal}) + (\text{Agency} * \text{Agency}))$$

After determining the angular location on the circumplex for each participant, each participant was assigned an octant (PA, BC ... NO), quadrant (I-IV), and hemisphere (1-2) categorical value. (See Table 5.)

Table 5. Orientation of the Quadrants and Octants by Degrees

Degrees	“Hemisphere”	Quad	Quad Descriptor	Oct – Desc	Octant
0 - 22	Communal	IV	Friendly-Dom	Warm - Agreeable	LM
22 - 67	Communal	IV	Friendly-Dom	Gregarious - Extraverted	NO
67 - 112	Communal	IV	Friendly-Dom	Assured – Dominant	PA
112 – 157	Acommunal	I	Hostile-Dom	Arrogant – Calculating	BC
157 – 202	Acommunal	I	Hostile-Dom	Cold – Hostile	DE
202 – 247	Acommunal	II	Hostile-Sub	Aloof – Introverted	FG
247 – 292	Acommunal	II	Hostile-Sub	Unassured – Submissive	HI
292 – 337	Communal	III	Friendly-Sub	Unassuming – Ingenuous	JK
337 – 360	Communal	III	Friendly-Sub	Warm - Agreeable	LM

While the point origin of the circumplex reflects the ‘average’ or ‘normalcy’ for *each* of the eight traits, it is actually more emotionally or psychologically ‘normal’ for an individual to exert him or herself along, at least, one personality trait, if not a few.²⁴ For this reason and because I wish to use subjects whose scores reflects some strength of trait, I have omitted those participants whose score is within one-half standard deviation of the origin. This circumscribed set was determined by computing the standard deviation for the vector length (for male and females, respectively) and dividing each participant’s vector length by the standard deviation, thus producing a fraction or decimal. All

²⁴ “Psychologically ‘normal’” – That is, from a psychological point of view, it is unusual – if not unhealthy – for one to exert average trait tendencies on all dimensions.

participants whose resulting value is within 0.5 or one-half -standard deviations are omitted from subsequent analyses.²⁵ Those subjects whose scores are within .5 standard deviation of the origin exhibit little to no dominant personality trait are not of interest to this study.

3.6 TAM-RELATED VARIABLES

3.6.1 Computer Anxiety

Computer anxiety was measured, using the Compeau and Higgins (Compeau et al. 1995) modification of the Computer Anxiety Rating Scale (Heinssen et al. 1987) from nineteen questions to four. The Heinssen et al. CARS had been previously validated (Webster et al. 1990). Adopting the Compeau and Higgins modification was made to for comparison purposes their 1995 study, regarding affect, computer self-efficacy, and computer anxiety. (In their study, negative affect was not shown to effect computer anxiety.)

3.6.2 Computer Self-Efficacy (Perceptions of Internal Control)

Computer self-efficacy was measured by slightly adapting the Compeau and Higgins (Compeau et al. 1995) CSE scales. Ten questions comprise the CSE scale and are answered on a six-point Likert scale from (1) *Disagree Strongly* to (6) *Agree Strongly*.

3.6.3 Disposition to Trust

The *Disposition to Trust* scale is used in management research. The scale consists of six items; our prior experience indicated a reliability of .80 (after the elimination of

²⁵ “Omitted from the study” – there are a very select few exceptions to this. Those who fell in the octant aggressive-dominant (PA) octant and whose vector length was 0.48 or 0.49 were included for subsequent analyses. These exceptions were made, because without including these exceptions, there were less than ten (8) participants in the PA octant and, thus, possibly creating excessive questionnaire item variances.

one question). Anticipated level of trust will be measured with the Pearce, Sommer, Morris, and Frideger (1992) *ex ante trust* scale, as modified by Jarvenpaa, Shaw, and Staples (Jarvenpaa et al. 2004). The measure consists of six questions; our prior experience indicated a reliability of .79.

3.6.4 Perceived Enjoyment (PE)

Perceived enjoyment is defined as the extent to which the activity of using (the program) is perceived to be enjoyable in its own right, apart from performance consequences (Davis et al. 1992) (p. 1113). Perceived enjoyment was measured using an adapted version of the Davis, Bagozzi et al. (Davis et al. 1992) PE scale. The scale consists of three questions, answered on a six-point Likert scale from (1) Disagree Strongly to (6) Agree Strongly. Davis, Bagozzi et al. determined a .81 Cronbach alpha. This measure has also been used by Venkatesh and Speirer (Venkatesh et al. 1999; Venkatesh et al. 2000) in organizational behavior research and human-computer interaction research.

3.6.5 Perceived System Performance (PSP). (Subjective Usability)

Perceived System Performance is defined as the “degree to which a person believes that a system is reliable and responsive during a normal course of operations” (Liu et al. 2006) (p. 50). Where Venkatesh (Venkatesh 2000) included *Objective Usability* in his extended extension of the TAM, I consider PSP as a subjective measure of usability. Perceived system performance was measured by adapting the Liping and Oinigxoing PSP scale. Liu and Ma (Liu et al. 2006) found that their PSP scale explained 18% of the variance in perceived usefulness (PU) and 46% of the variance in PEU (p. 54). The adapted scale consisted of four questions, answered on a six-point Likert scale from (1) Disagree Strongly to (6) Agree Strongly.

3.6.6 Trusting Intention (GN & FA)

Trusting Intention was measured by adapting McKnight, Choudhury, and Kacmar (McKnight et al. 2002) multidimensional trust scales for e-commerce. McKnight et al. developed four high-level interrelated trust constructs: *Disposition to Trust*, *Institution-based Trust*, *Trusting Beliefs*, and *Trusting Intentions*. Comprising each of these high-level constructs was a number of sub-constructs, each with their own particular questions. For my research, I adopted and adapted the sub-construct questions “Willingness to Depend (GN)” and “Subjective Probability of Depending (FA)” questions from the high level trust construct *Trusting Intentions*.

3.6.7 Perceived Usefulness (PU) and Perceived Ease of Use (PEU)

Perceived ease of use was measured using an adapted version of Davis’ (Davis 1989) PEU scales. Six questions comprise the PU scales. Five questions comprise the PEU scales. Both are answered on a seven-point Likert scale, from (1) “Extremely Likely” to (7) “Extremely Unlikely.”

3.6.8 Behavioral Intention (BI)

Behavioral intention is defined as a measure of the strength of one’s intention to perform a specific behavior (Fishbein et al. 1975) (p. 288); more pertinently, one’s intention to use an information system. Behavioral intention was measured using adapting Agarwal and Karahanna’ (Arguwal et al. 2000) scale, which they based on the recommendation of Ajzen and Fishbein (Ajzen et al. 1980). Three questions were directed specifically at behavioral intention to (re-) use the CBL system which the participants used in their class. Three questions were directed more generally at their behavior intention to use “another CBL application (similar to but not ‘*SimNet*’ in the future). Each set of questions were answered on a six-point Likert scale.

3.7 ANALYSES

Participants were grouped on three different levels: on the Communal axis level,²⁶ on the quadrant level,²⁷ and on the octant level.²⁸ This partitioning was, of course, made as a function of the participant's and participants' scores. Scores were normalized, and, thus, each participant's location on the IPC was a function of his or her score relative to the sample. As such, trait membership was neither random nor evenly distributed. Chi-Square goodness of fit analysis was conducted to compare the frequency of occurrences to minimum expected level of occurrences for the participants on each level (Communal axis, quadrant, and octant levels).

To test for the hypothesized differences between the IPC interpersonal trait delineations (e.g. octants) and the respective TAM-related variables (e.g. computer self-efficacy) the following analyses were used: regression analysis, two-sample or independent t-tests, and planned contrasts. Regression analysis was used to determine correlations between the level of the participants' self-reported agency and communality to the participants' self-reported Likert score on TAM-related constructs.²⁹ Simple t-tests were used to compare the differences between acommunal and communal participants (without regard to their 'level' of communality) on their scores to the TAM-related variables. Planned or a priori comparisons tests were used to compare specific octants and their scores on the TAM-related variables.

To conduct post hoc testing, I used Fisher's LSD, Sheffe's and Games-Howell. Fisher's LSD and Sheffe's are advised for post hoc analysis when sample sizes are unequal, as was the case in this research. Sheffe's is advised when making multiple post hoc comparisons; it is also considered the most conservative of post hoc tests. Fisher's LSD is considered the most liberal of post hoc tests. Given that my research (testing for correlations between IPC distinguished IT-users and their responses to TAM-related issues) is still nascent, the liberal quality of the LSD post hoc test will help provide

²⁶ Communal axis level: Acommunal or Communal (a.k.a. Dis-affiliative or Affiliative)

²⁷ Quadrant level: Hostile-Dominant, Hostile-Submissive, Friendly-Submissive, and Friendly-Dominant

²⁸ Octant level: assured-dominant (PA), arrogant/calculating (BC), cold-hostile (DE), aloof/introverted (FG), unassured/submissive (HI), unassuming/ingenuous (JK), warm/friendly (LM), gregarious/extroverted (NO).

²⁹ TAM-related constructs: computer self-efficacy, computer anxiety, perceived enjoyment, perceived system performance, trusting intentions, and perceived ease of use, perceived usefulness, and behavioral intention to use.

indicators to relationships that the more conservative Sheffe's may have missed. When variances are considered to be unequal, the Games-Howell test will be referred to for identification of significant differences.

3.8 CHAPTER SUMMARY

This chapter outlined the purpose of this study; the rationale for using a field-based experiment and, specifically the CBL component in a college class. This chapter outlined the application of Locke's Circumplex Scales of Interpersonal Values. Further, this chapter provided brief descriptions of the TAM-related scales used for this study. Finally, I described the methods of statistical analyses. In the following chapter, I provide the data analyses and results.

CHAPTER IV

DATA ANALYSES AND RESULTS

4.1 INTRODUCTION

This chapter presents the results from this study. This chapter is presented in seven (7) sections. This section (1) introduces the chapter and reiterates the purpose of the study. Section 4.2 outlines the reiterates the methodology used. Section 4.3 presents the descriptive results of the IPC scales. Section 4.4 presents the results for the scales and reliabilities. Section 4.5 presents the correlations among constructs. Section 4.6 presents the results of the hypotheses tests. Section 4.7 summarizes the noteworthy and itemized hypotheses results.

The participant response data were collected on a Web-based survey. The responses were banked in MS Access. The IPC data was first organized and normalized in MS Excel. The subsequent statistical analyses were conducted using the SPSS statistical package, version 14, student edition. The statistical analyses presented in this chapter include descriptive and inferential statistics.

The purpose of this study was to test for correlations between reported perceptions of technology and the users' interpersonal traits. Interpersonal circumplex theory distinguishes individuals along two major personality dimensions: control/power and friendliness/affiliation. More recently in the literature, these orthogonal dimensions are referred to as Agency and Communality. Organized around the circumplex in a clockwise fashion are eight traits; equally spaced, their location is function of their strength of agency and communality. Thus, the circumplex may be viewed in following three ways: firstly, as two (East and West) hemispheres: communal or acommunal; secondly, as four quadrants: Hostile-Dominant, Hostile-Submissive, Friendly-Submissive, and Friendly-Dominant; and, thirdly, and more commonly as eight octants: assured/dominant (PA), arrogant/calculating (BC), cold/hostile (DE), aloof/introverted (FG), unassured/submissive (HI), unassuming/disingenuous (JK), warm/friendly (LM), gregarious/extroverted (NO). To measure and assign participants to their respective octants, etc., the Circumplex Scale of Interpersonal Values (CSIV) was used (Locke 2000). Underlying all the hypotheses is the

assumption that, in effect, acommunal *things-persons* will experience and perceive technology differently than communal *people-persons*; moreover, the users' sense of personal agency (dominance) will further influence their experiences and perceptions.

4.2 METHODOLOGY SUMMARY

This study began in the Spring of 2007 with a convenience sample of 350 students from a large southwestern university. The traditional-aged college students were enrolled in an introductory computer class for non-business majors. A component of the curriculum required students to learn MS Excel and MS Access by using a commercially available computer based learning (CBL) software. Students were required to complete the associated lessons and quizzes as part of their class grade. Two online surveys were made available to the students. The first survey was provided at the first of the semester and participants were asked to rate their sense of computer self-efficacy and computer anxiety. The second survey was provided following the students' completion of both the CBL units on Excel and Access. The second survey asked the students to rate their perceptions of the CBL software, including their anxiety using it, their trust in it, and exogenous and standard TAM variables. Lastly, the survey inquired of the students' interpersonal values *vis-à-vis* the CSIV. All questions were answered on a Likert scale.

4.2.1 Population, Sample, and Participant

Participants were drawn from students enrolled in an introductory computer class for non-business majors at a large southwestern university. Of the three-hundred-and-fifty students initially enrolled in the class, 286 completed the first survey for participation rate of 78%. Of the 338 students remaining in the class at the end of the semester, 281 (83%) completed the second survey which followed the completion of their two CBL components, of these 276 were usable for a participation rate of 82%. Two-hundred and

seventy-six (276) participants completed the CSIV: 125 females, 151 males. For completing two surveys, students received nominal extra credit for their course.^{30 31}

4.3 DESCRIPTIVE CIRCUMPLEX RESULTS

4.3.1 Circumplex Distributions

For females, their mean scores were 2.05 for Agency (stdev=0.639) and 3.16 for Communion (sd=2.084). For males, their mean scores were 2.10 (sd=0.668) and 2.15 (sd=0.970), respectively. A t-test for difference between female and male Agency indicated no significant difference ($t=-0.665$, $df=259$, $p>0.05$). A t-test for difference between female and male Communion indicated a significant difference ($t=4.125$, $df=259$, $p<0.000$). To account for such differences, participant IPC trait scores were normalized by gender and thus was their assignment to the IPC categories.

After removing those participants whose scores were within one-half standard deviation from the origin of the circumplex, the remaining 245 participants were distributed as follows: by hemisphere, 127 participants scored as (left side) Acommunal; 118 scored as (right side) Communal. By quadrant: Quadrant I Hostile-Dominant 59; Quadrant II Hostile-Submissive, 68; Quadrant III Friendly-Submissive, 62; and Quadrant IV Friendly-Dominant, 56.

While interpersonal ‘trait membership’ is neither random, nor evenly distributed, Chi-Square goodness of fit tests were still calculated, comparing the frequency of occurrence for the hemispheres, quadrants, and octants. According to the Chi-Square tests, the two hemispheres should have a minimum expected cell frequency of 122.5; the four quadrants should have a minimum expected cell frequency of 61.3; and the eight octants should have a minimum expected frequency of 30.06. Therefore, for the hemisphere and quadrants, no significant deviation from the hypothesized values were found: for the

³⁰ NUMBER OF SUBJECTS: Later, after removing a number of students for being within one-half standard deviations of the origin of the circumplex, we had 245 subjects, 209 of whom had completed both surveys one and two. Therefore, for analyses of hypotheses concerning computer self-efficacy and general computer, n subjects was equal to 209; for all subsequent hypotheses concerning the use of the actual CBL software, n subjects equaled 245.

³¹ Utilization of a participant’s responses from the first survey required his or her completion of the second survey. Hypotheses testing required the students’ completion of the second survey which included the CSIV.

hemispheres (Chi-squared (1) = 0.331, $p > 0.05$); for the quadrants (Chi-square (3) = 1.286, $p > 0.05$).

For the octants, however, a significant deviation from the hypothesized values was found (Chi-squared (7) = 47.473, $p < 0.000$). Because participants are normalized on vectors, it is more appropriate to compare participant frequencies on opposite poles of each vector. (For participant distributions, refer to Appendix for Tables 6a and 6b.) By normalizing the data, the distribution of males and females around the circumplex was fairly equal. (See Table A1 and Table A2 for participant/circumplex breakdowns.)

4.4 SCALES AND RELIABILITIES

As noted in the prior chapter, all scales used in this research had been previously validated other studies.

To assess the internal consistency of my data set, the following item-total analysis tests were conducted: Pearson correlation coefficients, Cronbach's alpha, and exploratory factor analyses. All the survey scales satisfied the internal consistency tests, except for computer self-efficacy (CSE) and one of the two trusting intentions test (TI-gn). The Pearson correlation coefficient or Pearson's r was employed to determine the strength of the linear relationship between the scale items. With the exception of CSE, all item-total correlations were above 0.70. Cronbach's alpha determines the degree to which all items measure the same construct. With the exception of PSP and TI-gn, all of other scales had alphas above 0.800 and p -values < 0.000 . Perceived system performance (PSP) had a still acceptable alpha of 0.779 ($p < 0.000$). Trusting intention (TI-gn), while still having a Cronbach's alpha of 0.930, had an unacceptable p -value ($F=1.568$, $df=4$, $p=0.181$). (See Appendix for Table A3 Reliabilities.)

The inter-correlations of the ten CSE items were positive and within acceptable ranges. Computer anxiety general (CA-gen: general computer anxiety) yielded a Cronbach's alpha of 0.846 ($p < 0.000$). Computer anxiety specific (CA-sp: specific to the CBL) yielded a Cronbach's alpha of 0.851 ($p < 0.000$). The inter-correlations of the four CA items were positive and within acceptable ranges. Perceived enjoyment (PE using the CBL system) yielded a Cronbach's alpha of 0.924 ($p < 0.000$). The inter-correlations of the

four PE items were positive and within acceptable ranges. Perceived system performance (PSP) yielded a Cronbach's alpha of 0.779 ($p < 0.000$). The inter-correlations of the four PSP items were positive and within acceptable ranges. The second scale for trusting intention (TI-fa) yielded a Cronbach's alpha of 0.936 ($p < 0.000$). The inter-correlations of the six TI items were positive and within acceptable ranges. Perceived ease of use (PEU) yielded a Cronbach's alpha of 0.953 ($p < 0.001$). The inter-correlations of the five PEU items were positive and within acceptable ranges. Perceived usefulness (PU) yielded a Cronbach's alpha of 0.943 ($p < 0.000$). The inter-correlations of the five PU items were positive and within acceptable ranges. Behavioral intention (BI-sp: to use the CBL system) yielded a Cronbach's alpha of 0.859 ($p < 0.000$). Behavioral intention (to use an alternate CBL) yielded a Cronbach's alpha of 0.888 ($p < 0.000$). The inter-correlations of the three behavioral intention (BI) items were positive and within acceptable ranges. (See Appendix for Table A3, Reliabilities, and Table A4, Reliability Coefficients.)

For the exploratory factor analysis the extraction method was principal component analysis with varimax rotation. For all of the scales, except the CSE, eigenvalues and scree plot analysis indicated that the respective scale items loaded on a single factor. The principal component analysis on CSE indicated two factors: the first totaling 4.275 (42.8% of variance) and the second totaling 1.501 (15% of the variance).

4.4.1 The Decisions on the Questionable Scales

Trusting Intention (GN or TI-gn) is intended to measure *willingness to depend*. As noted above, per Cronbach's alpha, it had a p -value = 0.181. Its accompanying scale, "Trusting Intention (FA)," which is intended to measure *subjective probability of depending*, (McKnight et al. 2002) had Cronbach's alpha of 0.936 ($p < 0.000$). In light of the poor reliability of the trusting intention (GN) scale, that specific scale was dropped; however, the trusting intention (FA) scale was retained. (The TI-gn scale was not part of the Thatcher and Perrewé (2002) study.)

The **Computer Self-Efficacy (CSE)** scale consists of ten items. Pearson r indicated that the Pearson correlations for CSE ranged from 0.491 to 0.754. Exploratory factor analysis identified two factors with eigenvalues over 1.0, indicating that the scale was

measuring two constructs, rather than one: the first totaling 4.275 (42.8% of variance) and the second totaling 1.501 (15% of the variance). Despite the overall low reliability of CSE, the scale was retained for analyses. *Why?* One of the motivations for this experiment was to compare certain results here with those garnered by Thatcher and Perrewe (Thatcher et al. 2002), who researched Affect (negative affect) as it relates to CSE and computer anxiety. For purposes of comparison to their study, the CSE scale was retained intact.

4.5 CORRELATIONS AMONG CONSTRUCTS

Table A5 shows the correlations among the constructs in the study and Table A6 shows means and standard deviations. (See Appendix for Tables A5 and A6.) Dominance displayed no significant correlation to any of the dependent variables. Communal (Affiliation) showed two significant correlations, indicating two strong relationships: (1) between communal and perceived system performance (PSP), a positive correlation was found ($r = 0.145$, $p < 0.023$, $df = 235$), indicating a significant linear relationship; (2) between communal and perceived usefulness (PU), a positive correlation was found ($r = 0.131$, $p < 0.041$, $df = 235$), indicating a significant linear relationship.

Average Computer Self-efficacy (CSE) showed three significant correlations, indicating relationships: (1) A **positive** correlation was found ($r = 0.191$, $p < 0.006$, $df = 235$), indicating a significant linear relationship between CSE and behavioral intention (BI) to use this specific CBL in the future; (2) A **positive** correlation was found ($r = 0.189$, $p < 0.006$, $df = 235$), indicating a significant linear relationship between CSE and behavioral intention to use a different CBL in the future other than the specific one used for this class; (3) A **negative** correlation was found ($r = -.152$, $p < 0.041$, $df = 235$), indicating a significant linear relationship between CSE and perceived usefulness (PU).

General Computer Anxiety (CA-g) showed three significant correlations, indicating relationships. (1) A **positive** correlation was found ($r = 0.248$, $p < 0.000$, $df = 235$), indicating a significant linear relationship between computer anxiety (general) and computer anxiety (specific to using the CBL); (2) A **negative** correlation was found ($r = -0.145$, $p < 0.037$, $df = 235$), indicating a significant linear relationship between computer anxiety (general) and trusting intention (as a subjective probability of depending upon the

CBL); (3) a **negative** correlation was found ($r = -.188$, $p < 0.006$, $df = 235$), indicating a significant linear relationship between computer anxiety (general) and behavioral intention to use a CBL other than the specific CBL used in this class.

Computer Anxiety specific (CA-sp) to using the CBL showed four significant correlations, indicating relationships. One was discussed above (CA-g); three are elaborated here: (1) A **negative** correlation was found ($r = -0.196$, $p < 0.002$, $df = 235$), indicating a significant linear relationship between CA-sp and perceived system performance (PSP); (2) A **negative** correlation was found ($r = -0.141$, $p < 0.000$, $df = 235$), indicating a significant linear relationship between computer anxiety (specific) trusting intention (as a subjective probability of depending upon the CBL); (3) A **positive** correlation was found ($r = 0.156$, $p < 0.000$, $df = 235$), indicating a significant linear relationship between CA-sp and perceived ease of use (PEU).

Perceived Enjoyment (PE) using the CBL showed six significant correlations, indicating relationships. (1) A **positive** correlation was found ($r = 0.293$, $p < 0.000$, $df = 235$), indicating a significant linear relationship between PE and perceived system performance (PSP). (2) A **positive** correlation was found ($r = 0.563$, $p < 0.000$, $df = 235$), indicating a significant linear relationship between PE and trusting intention. (3) A **negative** correlation was found ($r = -.210$, $p < 0.001$, $df = 235$), indicating a significant linear relationship between PE and perceived ease of use (PEU). (4) A **negative** correlation was found ($r = -.375$, $p < 0.000$, $df = 235$), indicating a significant linear relationship between PE and perceived usefulness. (5) A **positive** correlation was found ($r = 0.530$, $p < 0.000$, $df = 235$), indicating a significant linear relationship between PE and behavioral intention (to use this specific CBL). (6) A **positive** correlation was found ($r = 0.404$, $p < 0.000$, $df = 235$), indicating a significant linear relationship between PE and behavioral intention to use a CBL other than this specific CBL.

Perceived System Performance (PSP) using the CBL showed seven significant correlations, indicating relationships. Two were elaborated above; five are elaborated here. (1) A **positive** correlation was found ($r = 0.422$, $p < 0.000$, $df = 235$), indicating a significant linear relationship between PSP and trusting intention. (2) A **negative** correlation was found ($r = -0.186$, $p < 0.004$, $df = 235$), indicating a significant linear relationship between PSP and perceived ease of use. (3) A **negative** correlation was found ($r = -0.169$, $p < 0.008$,

df=235), indicating a significant linear relationship between PSP and perceived usefulness. (4) A **positive** correlation was found ($r = 0.347$ $p < 0.000$, $df=235$), indicating a significant linear relationship between PSP and behavioral intention (to use this specific CBL). (5) A **positive** correlation was found ($r = 0.267$ $p < 0.000$, $df=235$), indicating a significant linear relationship between PSP behavioral intention (to use a CBL, other than this specific one).

Trusting Intentions (TI-fa) *as a subjective probability of depending* on the CBL showed five significant correlations, indicating relationships. One was elaborated above; four are elaborated here. (1) A **negative** correlation was found ($r = -0.242$, $p < 0.000$, $df=235$), indicating a significant linear relationship between TI-fa and perceived ease of use (PEU). (2) A **negative** correlation was found ($r = -.0521$, $p < 0.000$, $df=235$), indicating a significant linear relationship between TI-fa and perceived usefulness (PU). (3) A **positive** correlation was found ($r = 0.630$, $p < 0.000$, $df=235$), indicating a significant linear relationship between TI-fa and behavioral intention (to use this specific CBL in the future). (4) A **positive** correlation was found ($r = 0.577$, $p < 0.000$, $df=235$), indicating a significant linear relationship between TI-fa and behavioral intention (to use a CBL other than this specific CBL).

Perceived Ease of Use (PEU) of the CBL showed six significant correlations. Four were elaborated above; two are elaborated here: (1) A **positive** correlation was found ($r = 0.304$, $p < 0.000$, $df=235$), indicating a significant linear relationship between PEU and perceived usefulness (PU); (2) A **negative** correlation was found ($r = -0.157$, $p < 0.014$, $df=235$), indicating a significant linear relationship between PEU and behavioral intention to use (this specific CBL).

Perceived Usefulness (PU) of the CBL showed eight significant correlations. Six were elaborated above; two are elaborated here: (1) A **negative** correlation was found ($r = -0.496$, $p < 0.000$, $df=235$), indicating a significant linear relationship between PU and behavioral intent to use this specific CBL; (2) A **negative** correlation was found ($r = -.372$, $p < 0.000$, $df=235$), indicating a significant linear relationship between PU and behavioral intent to use a CBL other than this specific one.

Behavioral Intention (BI-specific) to use this specific CBL system showed seven significant correlations. Seven were elaborated above; one is elaborated here: (1) A

positive correlation was found ($r = 0.729$, $p < 0.000$, $df = 235$), indicating a significant linear relationship between BI-specific and BI-other.

4.6 TESTS OF THE HYPOTHESES

This section presents the results of the analyses of the correlations between the IPC scales and the TAM-related variables.

Recall, the IPC is oriented on the two major and universal personality dimensions of Agency (Dominance) and Communality (Affiliation). These dimensions are orthogonal and represent the vertical and horizontal axes, respectively. Circumscribing the axes are the eight IPC traits, depicted as equidistant and equally spaced descriptors. These two-word descriptors are also represented as two letter identifiers (PA, BC ... NO),³² running counter-clockwise, starting with PA (assured/dominant) at 12 o'clock, DE (cold/hostile) at 9 o'clock, HI (unassured/submissive) at 6 o'clock, and ending with NO (gregarious/extroverted) at approximately 1:30. As at each end of a dimension reside its 'polar opposite' personality (e.g. cold/hostile (DE) to warm/friendly (LM)), so too are the octants polar opposites (e.g. aloof/introverted (FG) to gregarious/extroverted (NO)).

Hypotheses/tests will be presented as follows: (Hypothesis A) A linear regression testing the hypothesized relationship between the particular construct and the Communality (Affiliation) dimension, controlling for the dimension of Agency (Dominance); (Hypothesis B) A planned contrast testing the hypothesized difference between one (or few) trait(s) against one (or few) trait(s). Hypotheses "B" will present the more constructive dispositions to technology adoption (i.e. higher computer self-efficacy or lower computer anxiety) in contrast to the less IT-amenable disposition. Significance levels for the hypotheses were tested at $\alpha < 0.05$. (A few of the tests indicated significance at $\alpha < 0.10$; these results will be included but qualified as occurring at $\alpha < 0.10$.)

Immediately following each respective set of hypotheses, I will present follow-up and post hoc analyses. For instance, where hypothesis "A" regresses levels of communality and agency onto a construct (e.g. computer anxiety), I may also present the results a straight t-test simply comparing acommunality against communality with regards to the

³² "These two word descriptors" (e.g. PA, BC...) may later be accompanied with a number (1-8) to help identify the respective octant on the accompanying illustrations in the Appendix.

construct. Similarly, where hypotheses “B” do not indicate significance (contrast both hypothesized high octants against two hypothesized low octants), I may present independent contrasts, where only one octant was contrasted against the opposing two. (For example, with regards to computer anxiety-specific, the planned contrast of FG and assured/dominant (PA) together against gregarious/extroverted (NO) and unassuming/ingenuous (JK) did not indicate a significant difference; however, a planned contrast specifying assured/dominant (PA) against gregarious/extroverted (NO) and unassuming/ingenuous (JK) did (at $p < 0.10$).) Overall, the TAM-related variables with which there was demonstrated moderate ($p < 0.10$) or significant ($p < 0.05$) support for the hypotheses are the following: Computer anxiety (CA-specific to using the CBL), perceived system performance, perceived ease of use, perceived usefulness, and behavioral intention to use the CBL in the future.

4.6.1 General Computer Self-Efficacy (CSE)

In general, hypotheses concerning general computer self-efficacy (CSE) predicted that CSE would be negatively correlated to the Communal axis. That is, acommunal participants would report higher average CSE than communal participants. The predominant rationale for these hypotheses is that the acommunal pole correlates with ‘things-persons;’ things-persons are occupational types whose career preferences incline towards mechanistic and technical.

CSE				1	2	3	4	5	6	7	8
		Acom	Com	PA	BC	DE	FG	HI	JK	LM	NO
Mean	4.512	4.518	4.506	4.345	4.65	4.384	4.673	4.440	4.743	4.462	4.468
SDev	0.761	0.786	0.736	0.541	0.597	0.941	0.682	0.579	0.698	0.804	0.726

A simple linear regression was calculated predicting the participants’ average CSE based on their communality (affiliation) and agency (dominance). No significant negative correlation was found. Next, a planned contrast was conducted to test hypotheses that octants aloof/introverted (FG) and cold/hostile (DE) were higher than

gregarious/extroverted (NO) and unassuming/ingenuous (JK). No significant differences were found. Therefore, we have the following results for computer self-efficacy (CSE):

H1a	Not Supported	Participants' level of communality was not significantly negatively correlated to computer self-efficacy.
H1b	Not Supported	Octant aloof/introverted (FG) and octant cold/hostile (DE) did not report significantly higher computer self-efficacy than octants gregarious/extraverted (NO) and unassuming/ingenuous (JK).

In sum, while the acommunal pole of the Communal (Affiliation) axis reported higher computer self-efficacy, the difference was not significant. Contrary to my anticipation that octant unassuming/ingenuous (JK, octant #6) would have the lowest CSE, instead it actually reported the highest CSE; however it was not significantly higher. (Illustration 2) Counter-intuitively – if not interestingly – it was the participants of the assured/dominant octant (PA, octant #1; mean=4.345, sd=0.541) that reported the lowest average CSE. (While the assured/dominant (PA, #1) octant reported the lowest average CSE and smallest standard deviation, the number of representative participants in that octant was the fewest at 11. The average number of participants per octant was 26.) Post hoc analysis, according to the more liberal Fishers LSD, indicates that at $\alpha < 0.10$ ($p = .062$), octant cold/hostile (DE, octant #3; mean=4.384, sd=0.941) was significantly lower than octant unassured/ingenuous (JK, octant #6; 4.743, sd=0.698).

On the quadrant level, I anticipated that the (southwest) Quadrant II Hostile-Submissive would have higher CSE than its opposite (northeast) Quadrant IV Friendly-Dominant. While the difference is not significant, the graph still depicts an interesting story. After remaining steady across quadrants I, II, and III (or increasing insignificantly), CSE appeared to drop precipitously at Quadrant IV, Friendly-Dominant. (See Illustration 1.) Contrasting the quadrant level graph with the octant level graph is still more interesting. Again, while the differences were not significant, the underlying phenomena appearing to take place within the quadrants suggests just how much may be masked by using broad global factor scales. (See Illustration 2.)

4.6.2.1 General Computer Anxiety (CA-g)

In general, hypotheses concerning general computer anxiety (CA-g) predicted that CA-g would be positively correlated to the Communal axis. That is, acommunal participants would report lower average computer anxiety, and the communal participants would report higher CA-g. The predominant rationale for these hypotheses was similar to CSE: the acommunal pole correlates with ‘things-persons:’ occupational types, whose career preferences incline towards mechanistic and technical; the communal pole correlates to “people-persons,” those whose occupational types incline towards the interpersonal.

CA-g				1	2	3	4	5	6	7	8
		Acom	Com	PA	BC	DE	FG	HI	JK	LM	NO
Mean	2.645	2.661	2.626	2.295	2.635	2.696	2.568	2.833	2.859	2.641	2.443
SDev	1.274	1.218	1.340	0.941	1.130	1.359	0.992	1.478	1.518	1.351	1.180

A simple linear regression was calculated predicting the participants’ average reported CA-g based on their agency (dominance) and communality (affiliation). No significant positive correlation was found. Next, a planned contrast was conducted to test hypotheses that octant aloof/introverted (FG) would report higher CA-g than octants gregarious/extroverted (NO) and unassuming/ingenuous (JK). No significant differences were found. Thus, we have the following results for general computer anxiety (CA-g):

H2a Not Supported Participants’ level of communality was not significantly positively correlated to general computer anxiety.

H2b Not Supported Octant aloof/introverted (FG) did not report significantly lower computer anxiety than octants gregarious/extraverted (NO) and unassuming/ingenuous (JK).

In sum, computer anxiety in general was not shown to be significantly correlated to the Communal axis or octant. Further, contrary to my hypothesis, the acommunal side reported the highest computer anxiety, rather than the hypothesized communal side; however, the difference was not significant. (See Illustrations 3 and 4.) Octant assured/dominant (PA, #1) reported the lowest CA, but octant unassuming/ingenuous (JK, #6) was among the highest; the differences, however, were not significant. Post hoc tests indicated no significant differences.

On the quadrant level, on the right side of the IPC, Quadrant III, Friendly-Submissive, reported the highest computer anxiety (2.841, $sd=1.473$) and Quadrant IV, Friendly-Dominant the lowest (2.358, $sd=1.1120$), but the differences were not significant. The quadrant level analysis failed the Levene statistic test of homogeneity of variances.

4.6.2.2 Computer Anxiety Specific (CA-sp) to the CBL

Hypotheses concerning computer anxiety specific to the CBL (CA-sp) were similarly anticipated and justified, as were the hypotheses for CA-g (above). That is, in light of research on RIASEC preferred occupational types (thing-persons vs. people-persons) and the RIASEC mappings to the IPC, I anticipated that the acommunal participants would report lower average computer anxiety and that the communal participants would report higher CA-sp.

CA-s				1	2	3	4	5	6	7	8
		Acom	Com	PA	BC	DE	FG	HI	JK	LM	NO
Mean	2.835	2.894	2.771	2.547	2.726	3.017	2.938	2.471	2.972	2.415	3.417
SDev	1.192	1.074	1.308	1.100	1.036	1.065	1.087	1.277	1.144	1.197	1.492

A simple linear regression was calculated predicting the participants' average CA-sp based on their agency (dominance) and communality (affiliation). No significant positive correlation was found. Next, a planned contrast was conducted to test hypotheses that octants aloof/introverted (FG) and assured/dominant (PA) would report higher CA-sp than octants gregarious/extroverted (NO) and unassuming/ingenuous (JK). At $alpha < 0.10$, octant aloof/introverted (FG; 2.938, $sd=1.087$) and octant assured/dominant (PA; 2.547, $sd=1.036$) did report significantly lower computer anxiety ($t=1.842$, $df=237$, $p=.067$) than octants gregarious/extraverted (NO; 3.417, $sd=1.492$) and unassuming/ingenuous (JK; 2.972; $sd=1.144$). Therefore have the following results for computer anxiety-specific (CA-sp):

H3a Not Supported

Participants' level of communality was not significantly positively correlated to computer anxiety specific to using the computer based learning system.

H3b Partially Supported At $\alpha < 0.10$, octant aloof/introverted (FG) and octant assured/dominant (PA) did report significantly lower computer anxiety than octants gregarious/extraverted (NO) and unassuming/ingenuous (JK) ($t=1.842$, $df=237$, $p=.067$).

In sum, computer anxiety specific (CA-sp) to using the CBL software was not shown to be significantly correlated to the Communal axis, but the hypothesis was somewhat supported on the octant level. Contrary to my hypothesis, the acommunal pole reported higher computer anxiety specific to using the CBL software, however the difference was not significant. (The communal level data also failed the Levene's test for equality of variances.) Hypothesis 3B was partially supported at $\alpha < 0.10$: aloof/introverted (FG) and assured/dominant (PA) reported significantly lower CA-sp than gregarious/extroverted (NO) and unassuming/ingenuous (JK). Follow-up analysis indicated, however, that of octants aloof/introverted (FG, #4) and assured/dominant (PA, #1), only octant assured/dominant (PA; mean=2.547, sd=1.1) reported significantly lower CA-sp ($\alpha < 0.10$, $p=0.052$) than octants gregarious/extravert (NO; mean=3.492, sd=1.492) and unassuming/ingenuous (JK; mean= 2.972, sd=1.144). (See Illustration 5.) Fishers LSD post hoc analysis indicated that octant gregarious/extraverted (NO, #8) reported significantly higher CA-sp than four octants: assured/dominant (PA, #1), arrogant/calculated (BC, #2), unassured/submissive (HI, #5), warm/friendly (LM, #7). Fishers LSD also indicated that warm/friendly (LM, #7) was significantly lower than its opposite octant cold/hostile (DE, #3).

Though no hypotheses were advanced regarding the quadrants, Quadrant III (2.61, sd=1.214), again, reported the lowest computer anxiety specific to the CBL and Quadrant IV (2.95, sd=2.95) reported the highest; neither was significant, however. I anticipated that the Southwest, Quadrant II, Hostile-Submissive, would have the have the lowest computer anxiety and Northeast Quadrant IV, Friendly-Dominant, the highest. As did the CA-sp on the quadrant level, the CA-sp quadrant-level analysis also failed the Levene Statistic for homogeneity of variances. The quadrant level graph of computer anxiety (specific to using the CBL; CA-sp) suggests that, superficially, the prediction was partially correct. (See Illustration 5)

More noteworthy, however, is the story within Quadrant IV. Quadrant IV, Friendly-Dominant, contains the dominant half of octant warm/friendly (LM, # 7), all of octant gregarious/extroverted (NO, # 8) and the friendly side of assured/dominant (PA, #1). This comparison of quadrant level to octant level illustrates the robust advantage of using eight dimensions to segregate personality traits into rather than two or four. Quite possibly, the Mood Model dimension of Positive Affect – which maps to the extraversion (NO) and dominance (PA) vicinity of Quadrant IV of the IPC (Costa Jr. et al. 1980; McCrae et al. 1989; Warr et al. 1983) – might have missed the personality distinction identified by here IPC. Or, if the Mood Model had picked up the high computer anxiety at extraversion and dominance (Positive Affect), would it have missed the significant decline in CA-sp slightly down the dimension scale of Agency (Dominance) where the IPC locates octant warm/friendly (LM)? I think not. The finding here, however, that octants assured/dominant (PA, #1) and warm/friendly (LM, #8) report lower CA-sp does correspond to Korunkoda's (Korunkoda 2007) research on the Five Factor Model and computer anxiety. Korunkoda found a correlation between low computer anxiety and Conscientiousness. (See Chapter II, section "Computer Anxiety and the Five Factor Model.") Conscientiousness has been found to map to IPC octants assured/dominance (PA) (Ansell et al. 2004) and warm/friendly (LM) (Schmidt et al. 1999).

4.6.3 Perceived Enjoyment (PE)

In general, hypotheses concerning perceived enjoyment (PE) predicted that PE would be positively correlated on the Communal axis. That is, communal participants (primarily octants unassuming/ingenuous (JK), warm/friendly (LM), and gregarious/extroverted (NO)) would report higher average PE, and acommunal participants (primarily octants arrogant/calculating (BC), cold/hostile (DE), and aloof/introverted (FG)) would report lower average PE. Among the predominant rationale for these hypotheses was that 'Positive Affect' - which maps to the communal pole – reflects a person's enthusiasm and pleasurable engagement. Further the Five Factor Model (FFM) factor Agreeableness – reflecting altruism and tender-mindedness – also maps towards the communal pole of the

IPC. Conversely, the FFM factor Neuroticism correlates to “Negative Affect” and dissatisfaction; both of these map to the acommunal pole of the communal axis.

PE				1	2	3	4	5	6	7	8
		Acom	Com	PA	BC	DE	FG	HI	JK	LM	NO
Mean	2.830	2.766	2.898	3.167	2.548	2.718	3.042	3.137	3.148	2.515	3.012
SDev	1.226	1.181	1.275	0.973	0.941	1.116	1.643	1.068	1.325	1.291	1.252

A simple linear regression was calculated predicting the participants’ average PE based on their agency (dominance) and communality (affiliation). No significant positive correlation was found. Next, a planned contrast was conducted to test hypotheses that octants gregarious/extraverted (NO) and warm/friendly (LM) were higher in PE than octants cold/hostile (DE) and aloof/introverted (FG). No significant differences were found. Therefore, we have the following results for perceived enjoyment (PE):

H4a Not Supported	Participants’ level of communality was not significantly positively related to perceived enjoyment using the computer-based learning system.
H4b Not Supported	Octant gregarious/extraverted (NO) and octant warm/friendly (LM) did not report significantly higher perceived enjoyment using the computer-based learning system than octants cold/hostile (DE) and aloof/introverted (FG).

In sum, perceived enjoyment (PE) was not shown to be significantly correlated to the Communal axis nor to the hypothesized octants. While the communal (friendly) side of the IPC did report higher perceived enjoyment of the CBL software, the difference was not significant. Contrary to my anticipation, octant warm/friendly (LM, #8) did *not* report the highest perceived enjoyment but rather the *lowest* (mean=2.515, sd=1.29) – and somewhat significantly so. (See Illustration 8.) At alpha <0.10 *Fisher’s LSD* post hoc test indicated that octant warm/friendly (LM, #8) reported significantly lower average perceived enjoyment than four octants: assured/dominant (PA, #1), octant aloof/introverted (FG, #4), gregarious/extraverted (NO, #8), and unassuming/ingenuous (JK, #6 at alpha<0.05). This is noteworthy for a couple of reasons: first, octant warm/friendly’s (LM, #7) perceived enjoyment is significantly lower than both of its neighboring octants

unassuming/ingenuous (JK, #6) and gregarious/extraverted (NO, #8); and second, this outcome regarding PE is counter-intuitively similar to CA-sp: in that analysis octant warm/friendly (LM) reported comparatively lower CA-sp than octants unassuming/ingenuous (JK,) and gregarious/extraverted (NO). (See Illustration 6, more on this later.) Octant arrogant/calculating (BC, #2; mean=2.55, sd=0.94) reported the second lowest average perceived enjoyment, which at $\alpha < 0.10$ was significantly lower than octant assured/dominant (PA, #1; $p=0.10$) and unassuming/ingenuous (JK, #6; $p=0.067$).

From Illustration 8, one can see that octant assured/dominant (PA, #1; mean=3.17 sd=0.97) reported the highest PE, while its neighboring communal octant arrogant/calculation (BC, #2; mean=2.55, sd=0.94) reported practically the lowest in PE. What is not surprising is that polar opposites of the same dimension are diametrically opposed on a construct scale (e.g. octant BC #2 and octant JK #6). In this instance, octant arrogant/calculation (BC, #2) reportedly practically the lowest PE (mean=3.15, sd=1.32) and its opposite, octant unassuming/ingenuous (JK, #6), reported practically the highest PE (mean=3.148, sd=1.325). What is surprising is that there would appear to be such dramatic drops in perceived enjoyment from octant assured/dominant (PA, #1) to octant arrogant/calculating (BC, #2), as well as from octant unassuming/ingenuous (JK, #6) to warm/friendly (LM, #7). Such outcomes were not expected. I have no proposed explanations as to these contrasts, although the alignment of arrogant/calculating (BC, #2), cold/hostile (DE, #3), and warm/friendly (LM, #7), suggests that activity may be associated with the proximity to the Communal axis and the weakness of agency.

On the quadrant level, I anticipated that Northeast Quadrant IV, Friendly-Dominant, would have the highest level of PE. This anticipation was due to the dispositions by octant warm/friendly (LM, #7) and gregarious/friendly (NO, #8) to enjoy experiences (however, this did not bear out in this experiment for octant warm/friendly (LM)). In addition, (Mood Model) Positive Affect – which is characterized by a disposition to positive, satisfying engagements – maps to the area of Quadrant IV. Further, the FFM factors of Extraversion and Openness to Experience also map to the same area (extraversion and agreeableness, respectively). From Illustration 7, one can see that Quadrant I (mean=2.62, sd=1.01) reported the lowest PE; however, it was not significantly different than Quadrants II, III, or IV (2.89, 2.92, 2.88, respectively). Again, important to

note, is how the quadrant level averages (Illustration 7) masks the underlying octant level averages (Illustration 8). Quadrant I is comprised of all of octant arrogant/calculating (BC, #2) and the Hostile-Dominant halves of octants assured/dominant (PA, #1) and cold/hostile (DE, #3). A visual comparison of Illustrations 7 and 8 indicates how much of ‘the story’ of Quadrant I is missing at the level.

4.6.4 Perceived System Performance (PSP)

In general, hypotheses concerning perceived system performance (PSP) predicted that PSP would be positively correlated to the Communal axis. That is, communal participants (primarily octants unassuming/ingenuous (JK), warm/friendly (LM), and gregarious/extroverted (NO)) would report higher average PSP, and acommunal participants (primarily octants arrogant/calculating (BC), cold/hostile (DE), aloof/introverted (FG)) would report lower average PSP. The predominant rationales for these hypotheses are similar to the ones made for PE, regarding Positive and Negative Affect and their correlations to the communal and acommunal poles, respectively. While those individuals high in negative affect dwell upon and magnify mistakes (Watson and Clark, 1984), Carson elucidated Leary’s (Leary 1957) IPC theory by stating that high Friendly-Dominant types “would be particularly likely to give their relationship partners the benefit of the doubt in potentially problematic situations” (Carson 1969 citing Leary 1957, p. 614).

PSP				1	2	3	4	5	6	7	8
		Acom	Com	PA	BC	DE	FG	HI	JK	LM	NO
Mean	3.664	3.537	3.80	3.719	3.427	3.593	3.50	3.50	3.935	3.864	3.713
SDev	1.011	0.969	1.042	1.083	1.035	0.90	1.101	1.079	0.972	1.063	1.004

A simple linear regression was calculated predicting the participants’ average PSP based on their agency (dominance) and communality (affiliation). No significant positive relationship was found at $p < 0.05$. At $\alpha < 0.10$ a significant relationship is found ($F = 2.588$, $df = 2$, $p = 0.077$), however its R-squared was only 0.021. Participants predicted PSP is equal to $3.664 + 0.000 * (\text{Agency}) + 0.072 * (\text{Comm})$. Participants’ average PSP increased 0.072 for each Likert unit (on a one to seven scale). Next, a planned contrast was

conducted to test hypotheses that octants gregarious/extroverted (NO) and warm/friendly (LM) were higher than cold/hostile (DE) and aloof/introverted (FG). No significant differences were found. Therefore, we have the following results for perceived system performance (PSP):

- | | |
|--------------------------------|--|
| H5a <i>Partially</i> Supported | At $p < 0.10$, participants' level of communality was significantly positively correlated to their perceived system performance of the computer-based learning system ($F = 2.588$, $df = 2$, $p = 0.25$) with an R-squared of 0.021. |
| H5b Not Supported | Octant gregarious/extraverted (NO) and warm/friendly (LM) did not report significantly higher perceived system performance of the computer-based learning system than octants cold/hostile (DE) and aloof/introverted (FG). |

In sum, at $\alpha < 0.10$, one's level of communality was positively related to computer PSP; however, the proportion of the variance explained, as determined by the coefficient of correlation, R-squared, was minimal (2.1%). A simple t-test, contrasting the left acommunal side (mean=3.537, sd=0.969) of the IPC with the right communal side (mean=3.8, sd=1.042), indicated a significant difference ($t = -2.051$, $df = 243$, $p < 0.05$). The second hypothesis (B) was not supported. Octant unassuming/ingenuous (JK), rather than gregarious/extraverted (NO), was the highest in PSP. Octant warm/friendly (LM) was second highest in reported PSP. Post hoc analyses (LSD) indicated that, at $\alpha < 0.10$, octant arrogant/calculating (BC) reported significantly lower average PSP than octants unassuming/ingenuous (JK) and warm/friendly (LM). (See Illustration 10.)

On the quadrant level, what I had anticipated was that the Northeast Quadrant IV, Friendly-Dominant, would be significantly higher than the Southwest Quadrant II, Hostile-Submissive. This was not so. (See Illustration 9.) Quadrant II, Hostile-Submissive, did not evaluate system performance as critically as I had anticipated – instead, Quadrant I, Hostile-Dominant, did. Post hoc multiple comparisons tests, according to Fisher's Least Significant Differences, indicated that Northwest Quadrant I, Hostile-Dominant (mean=3.436, sd=0.933), reported significantly lower PSP ($t = 1.977$, $df = 241$, $p < 0.05$) than Southwest Quadrant III, Friendly-Submissive (mean 3.798, sd 1.121). And, at $\alpha < 0.10$, Quadrant I was significantly different ($t = -1.955$, $df = 241$, $p = 0.052$) with Quadrant IV

(mean=3.803, sd=0.957). From the quadrant level perspective, H5A is supported somewhat equally by both quadrants.

While quadrants I and IV (Hostile-Dominance and Friendly-Dominance) were very near $\alpha < 0.05$ significance level, the actual difference lay underneath in two specific octants. (See Illustration 10.) Quadrant I is comprised of octant arrogant/calculating (BC, #2) and the Hostile-Dominant halves of octants assured/dominant (PA, #1) and cold/hostile (DE, #3). Quadrant IV is comprised of octant gregarious/extroverted (NO, #8) and the Friendly-Dominant halves of octants assured/dominant (PA, #1) and warm/friendly (LM, #7). The octant driving the significant difference between Quadrant I and IV is octant arrogant/calculating (BC, #2) (and to a slight degree octant warm/friendly (LM, #7)). (See Illustration 8.) More dramatically, the significant difference between Quadrant I and III appears to be driven by octants arrogant/calculating (BC, #2) and octant unassuming/ingenuous (JK, #6).

4.6.5 Trusting Intentions (TI-fa)

In general, hypotheses concerning trusting intentions (TI) predicted that TI would be positively correlated to the Communal axis. That is, communal participants (primarily octants unassuming/ingenuous (JK), warm/friendly (LM), and gregarious/extroverted (NO)) would report higher average TI, and acommunal participants (primarily octants arrogant/calculating (BC), cold/hostile (DE), aloof/introverted (FG)) would report lower average TI. The predominant rationale for these hypotheses is that the communal dimension of the IPC corresponds to interpersonal trust: the communal pole correlates to trust and the acommunal pole, distrust (Carson 1969; Gains Jr. et al. 1997; Gurtman 1992b; Kiesler 1983; Leary 1957; Strong et al. 1986).

TI-fa				1	2	3	4	5	6	7	8
		Acom	Com	PA	BC	DE	FG	HI	JK	LM	NO
Mean	3.687	3.665	3.710	3.969	3.624	3.607	3.701	3.706	3.667	3.598	3.907
SDev	1.118	1.046	1.194	1.191	1.185	0.938	0.926	1.222	1.135	1.284	1.030

A simple linear regression was calculated predicting participants' average TI-fa base on their agency (dominance) and communality (affiliation). No significant positive correlation was found. Next, a planned contrast was conducted to test the hypothesis that octant unassuming/ingenuous (JK) and warm/friendly (LM) would report significantly higher TI-fa than octants arrogant/calculating (BC) and cold/hostile (DE). No significant differences were found. Therefore, we have the following results for trusting intention (TI-fa):

H6a	Not Supported	Participants' level of communality was not significantly positively correlated to trusting intention to use the computer-based learning system in the future.
H6b	Not Supported	Octant unassuming/ingenuous (JK) and octant warm/friendly (LM) did not report significantly higher average trusting intention to use the computer-based learning system in the future than octants arrogant/calculating (BC) and cold/hostile (DE).

In sum, trusting intentions (TI-fa) was not shown to be significantly correlated to the Communal axis or octants as hypothesized. While the communal pole reported higher trusting intentions, the difference was not significant. While quadrant-level hypotheses were not advanced, contrary to expectations, the Southeast Quadrant III, Friendly-Submissive, reported the lowest trusting intentions; however the difference was not significant. Quadrant IV, Friendly-Dominant, reported the highest trusting intentions, however the difference was not significant. The two octants most primarily associated with trust and distrust in the IPC literature (unassuming/ingenuous (JK) and arrogant/calculating (BC), respectively) and were included in the contrasts; unexpectedly, *both* reported the scores that were closest to the average TI-fa (as a subjective probability of using the system in the future). The IPC literature identifies octant unassuming/ingenuous (JK) *interpersonal trustiness* (trusting in their interpersonal other).

4.6.6 Perceived Ease of Use (PEU)

In general, hypotheses concerning perceived ease of use (PEU) predicted that PEU would be negatively correlated on the communal hemisphere. That is, acommunal

participants would report higher average PEU than communal participants. The predominant rationale for these predictions parallels that for the hypotheses concerning computer self-efficacy (CSE). Perceived ease of use can also be influenced by one's CSE (Venkatesh et al. 1996). The acommunal pole corresponds to the RIASEC "things-pole," indicating such preferred occupations or trades as electrical, technical, mechanical, and construction (Holland 1966; Tracey 1997). The RIASEC Realistic type near the things-pole most corresponds to the IPC octant aloof/introverted (FG). Further, RIASEC personality types Artistic and Social reported the highest computer anxiety (Bellando et al. 1985). Artistic and Social types correlate to the IPC communal octants warm/friendly (LM) and gregarious/extraverted (NO).

PEU				1	2	3	4	5	6	7	8
		Acom	Com	PA	BC	DE	FG	HI	JK	LM	NO
Ave	2.512	2.702	2.307	2.463	2.413	2.844	2.517	2.353	2.37	2.305	2.504
S.Dev	1.357	1.388	1.298	1.608	1.252	1.382	1.436	0.996	1.166	1.335	1.617

A simple linear regression was calculated predicting the participants' average PEU based on their agency (dominance) and communality (affiliation). No significant negative correlation was found. While the overall regression was not significant ($p=0.143$), the table of coefficients indicated that communality had a significant relationship to PEU ($p<0.05$); however, the overall R-squared for the regression was still only 0.016. Participants' predicted PEU is equal to $2.512 + -0.019 * (\text{Agency}) + -0.085 * (\text{Communality})$, when PEU is measured on a one-to-seven Likert scale and IPC score is measured on the CSIV scale. Participants' average PEU response decreased -0.019 for each unit of Agency and decreased -0.085 for each unit of Communality. The table of coefficients indicated that Communality is more significant at $p=0.049$ ($t=-1.98$) than Agency at $p=.790$ ($t=0.267$).

Next, a planned contrast was conducted to test the hypothesis that octant aloof/introverted (FG) was higher than octants gregarious/extraverted (NO) and warm/friendly (LM). No significant differences were found. Therefore, we have the following results for perceived ease of use (PEU):

- H7a Not Supported Participants' level of communality was not significantly negative correlated to their perceived ease of use of using the computer-based learning system.
- H7b Not Supported: Octant aloof/introverted (FG) and cold/hostile (DE) did not report significantly higher average perceived ease of use of the computer-based learning system than octants gregarious/extraverted (NO) and warm/friendly (LM).

In sum, regression indicated that perceived ease of use (PEU) was not significantly correlated to communality and dominance. A simple t-test, however, contrasting the left, acommunal side of the IPC with the right, communal side, indicated that those along the acommunal pole (mean=2.7, sd=1.388) reported significantly higher PEU ($t=2.299$, $df=243$, $p<0.05$) than those along the communal vector (mean=2.307, sd=1.298). Hypothesis H7B was not supported. Independently, however, contrasting octant cold/hostile (DE; #3; 2.844, sd=1.382) versus octants gregarious/extraverted (NO, #8; mean=2.504, sd=1.617) and warm/friendly (LM, #7; mean=2.305, sd=1.335) at $\alpha<0.10$ indicated a significant difference ($t=0.347$, $df=237$, $p=0.072$). Octant cold/hostile (DE, #3) reported the highest average PEU (mean=2.844, sd=1.382). Octant, warm/friendly (LM, #7) reported the lowest average PEU (mean=2.305, sd=1.335).

4.6.7 Perceived Usefulness (PU)

In general, hypotheses concerning perceived usefulness (PU) predicted that PU would be positively correlated to the Communal axis. That is, communal participants would report higher average PU than acommunal participants. The predominant rationale for these hypotheses was that according to Mood Model theory, Positive Affect positively correlates to optimism and Negative Affect positively correlates to pessimism (Lucas et al. 1996). In that Positive Affect and Negative Affect correlate to the IPC communal and acommunal poles (Remington et al. 2000; Yik et al. 2004), it is axiomatic that the level of communality is positively correlated to optimism and negatively correlated to pessimism.

PU				1	2	3	4	5	6	7	8
		Acom	Com	PA	BC	DE	FG	HI	JK	LM	NO
Mean	3.287	3.203	3.378	3.163	3.187	3.092	3.258	3.624	3.333	3.764	2.896
SDev	1.414	1.272	1.553	1.183	1.215	1.282	1.228	1.684	1.654	1.742	1.013

First, it should be noted that perceived usefulness (PU) failed the Levene test for homogeneity of variance ($p < 0.00$) for the communal dimension comparisons test, the quadrant-level comparisons, and the octant-level comparisons. A simple linear regression was calculated predicting the participants' average PU based on their agency (dominance) and communality (affiliation). A significant regression equation was found ($F = 3.321$, $df = 2$, $p < 0.05$) but with an R-square of 0.027. Participants' predicted PU is equal to $3.287 + -0.115 * (\text{Agency}) + 0.082 * (\text{Comm})$, when PU is measured on a one-to-seven Likert scale and IPC score is measured on the CSIV scale (32 question short form; Likert 0-4). Participants' average PU response decreased 0.115 for each unit of Agency and it increased 0.082 for each unit of Communality. The table of coefficients indicated that Communality is more significant at $p = 0.065$ ($t = 1.854$) than Agency at $p = 0.124$ (-1.544).

Next, a planned contrast was conducted to test the hypotheses that octant gregarious/extraverted (NO) was significantly different than octants aloof/introverted (FG) and unassured/submissive (HI). A significant differences was found at $\alpha < 0.05$; however, the relationship was *reversed*: at $\alpha < 0.10$, octant gregarious/extraverted (NO) reported significantly *lower* perceived usefulness than octants aloof/introverted (FG) and unassured/submissive (HI). (Because the variances were rejected by the Levene Test for equality of variance, the contrast test for significance did not assume equal variances.) Therefore, we have the following results for perceived usefulness (PU):

H8a Supported	Participants level of communality was positively related to the level of their reported perceived usefulness of the computer-based learning system.
H8b Not Supported:	Octant gregarious/extraverted (NO) reported significantly <i>lower</i> average perceived usefulness (at $\alpha < 0.10$) of the computer-based learning system than octants unassured/submissive (HI) and aloof/introverted (FG), rather than reporting higher average PU.

As a reminder, perceived usefulness failed the Levene test for homogeneity of variance ($p < 0.00$) for the communal dimension comparisons test, the quadrant-level comparisons, and the octant-level comparisons.

In sum, perceived usefulness (PU) was shown to be significantly correlated to the agency and communal dimensions; however, the percentage of variance explained as indicated by R-squared was only 2.7%. PU was positively correlated to communality. A simple t-test, however, indicated no significant differences between those along the acommunal vector versus those along the communal side, regarding reported PU. Contrary to expectations, octant gregarious/extraverted (NO, #8) reported the lowest PU (average 2.896 sd=1.013), rather than the highest. (See Illustration 14.) Rather than octant gregarious/extraverted (NO) reporting most positively about the PU of the CBL, at $\alpha < 0.10$ octant (NO) reported significantly lower PU ($t = 1.764$, $df = 52.036$, $p = 0.084$) than octants unassured/submissive (HI, #5) and unassuming/ingenuous (JK, #6). Worth noting, octant gregarious/extrovert's (NO, #8) neighboring octant warm/friendly (LM, #7) reported the highest average PU (3.76, sd=1.742).

While quadrant level hypotheses were not advanced, I anticipated that Quadrant IV, Friendly-Dominant, would report the highest PU and that its diagonally opposite quadrant, Hostile-Submissive (Quadrant II), would report the lowest. Contrary to my expectations, the Friendly-Dominant Quadrant IV (mean = 3.082, sd=1.333) reported the lowest PU. (See Illustration 13.) Further, according to Fishers LSD post hoc test, Quadrant IV, Friendly-Dominant was significantly lower ($p = 0.031$) than its fellow communal Quadrant III, Friendly-Submissive (mean=3.645, sd=1.694). Quadrant III, Friendly-Submissive, had the highest mean (3.645, sd=1.694) and at $\alpha < 0.10$, it was also significantly higher ($p = 0.053$) than Quadrant II, Hostile-Submissive (3.164, sd=1.317). Therefore, while I was correct in anticipating that Quadrant II, Hostile-Submissive, would report low PU, I was incorrect in reasoning that Quadrant IV, Friendly-Dominant, would report the highest.

Reviewing Illustration 14 does suggest that from octant warm/friendly (LM, #7) to octant gregarious/extraverted (NO, #8), there is a rather conspicuous drop (LM: average 3.76 sd=1.742, to NO: average 2.896 sd=1.013). Recalling violation(s) of the Levene test for homogeneity of variance, one should be conservative in interpreting the decline. The higher averages for octant unassured/submissive (HI, #5), unassuming/ingenuous (JK, #6) and warm/friend/y (LM, #7) does suggest continuous support across the three octants for Quadrant III, Friendly-Submissive, as the highest quadrant and that it was not the result of one extreme octant.

4.6.8 Behavioral Intention to Use (BI) This Specific CBL Software

In general, hypothesis A concerning behavioral intention (BI) predicted that BI would be negatively correlated to the Communal axis. That is, acommunal participants would report higher average BI than communal participants. The predominant rationale for this hypothesis is my *implicit* hypothesis that acommunal individuals are more predisposed to finding technology agreeable; acommunal individuals are ‘things-people’ and should therefore report higher computer self-efficacy and lower computer anxiety and be more disposed to using technology readily. Hypothesis B predicted two polar opposite octants would report higher BI: octant aloof/introverted (FG) – because of its high correlation to the RIASEC preferred *Realistic* (mechanical/technical) occupations; and (FG’s opposite) octant gregarious/extravert (NO) – because of its optimism, outgoingness, and possible tendency to endorse. Octant unassured/submissive (HI), for reasons of its IPC trait adjectives/descriptors (e.g. lazy), would be hypothesized to be lowest octant.

BI-specific				1	2	3	4	5	6	7	8
		Acom	Com	PA	BC	DE	FG	HI	JK	LM	NO
Ave	2.967	3.06	2.867	3.00	2.914	3.096	3.375	2.470	2.914	2.644	3.259
S.Dev	1.307	1.278	1.337	1.167	1.022	1.282	1.561	1.236	1.329	1.348	1.375

A simple linear regression was calculated predicting the participants’ average behavioral intention (BI) based on their agency (dominance) and communality (affiliation). No significant negative correlation was found. Next, a planned contrast was conducted to test the hypothesis that octants aloof/introverted (FG; 3.375, sd=1.561) and gregarious/friendly (NO; 3.259, sd=1.375) reported higher BI than octant unassured/submissive (HI; 2.470, sd=1.236). A significant difference was found ($t=2.333$, $df=237$, $p<0.05$). Therefore, we have the following results for behavioral intention (BI):

H9a Not Supported

Participants level of communality was not significantly negatively related to the level of reported behavioral intention to use this specific computer-based learning system in the future.

H9b Supported: Octant aloof/introverted (FG) and octant gregarious/extraverted (NO) reported higher average behavioral intention to use this specific computer-based learning system than octant unassured/submissive (HI) ($t=2.332$, $df=237$, $p<0.05$).

In sum, behavioral intention (BI) to use this same CBL was not shown to be significantly negatively correlated to the Communal axis. Hypotheses B was supported, indicating both a positive and negative correlation to the extroversion/introversion axis. Octants aloof/introverted (FG, #4; 3.375, $sd=1.561$) and gregarious/extraversion (NO, #8; 3.259, $sd=1.375$) reported the highest BI, respectively. (See Illustration 16.) Fisher's LSD Post hoc analysis indicated that octant aloof/introverted (FG, #4) was also significantly higher than octant warm/friendly (LM, #7; 2.644, $sd=1.348$). Octant unassured/submissive (HI, #5; 2.470, $sd=1.236$), which reported the lowest BI, in the LSD post hoc multiple comparison's test was significantly lower than octant aloof/introverted (FG, #4) at $p<0.05$ and, at $\alpha<0.10$, it was significantly lower than gregarious/extroverted (NO, #8) ($p=0.051$) and octant cold/hostile (DE, #3). Also at $\alpha<0.10$, octant warm/friendly (LM, #7) reported significantly lower BI than cold/hostile (DE, #3) and gregarious/extraverted (NO, #8).

On the quadrant level, Quadrant II reported the highest average BI-sp (3.176, $sd=1.383$) and Quadrant III the lowest (2.769, $sd=1.354$) and, according to post hoc LSD tests, were significantly different at $\alpha<0.10$. Quadrants I and IV were most similar with means of 2.927 ($sd=1.141$) and 2.976 ($sd=1.321$). (See Illustration 15.)

4.7 SUMMARY OF RESULTS

Two hundred and nine (209) participants completed both survey 1 (CSE and CA-general) and survey 2 (IPC traits, CA-specific, PE, PSP, PEU, PU, BI). Two-hundred and forty-five (245) completed the second survey. Of the 245, 112 were females, 133 were males. The split along the communal dimension was approximately equal: 127 acommunal, 118 communal. Distributions of participants along octants were unequal with lows at either end of the Agency (or Control) dimension: 16 scored as assured/dominant (PA), 17 scored as unassured/submissive (HI). The most participants were along the Communal

(Affiliativeness) dimension: 59 scored as cold/hostile (DE), 44 scored as warm/friendly (LM). The average number of participants per octant was 30.6.

The correlation matrix³³ of all the factors indicated no correlations with Agency (Dominance) and two correlations with Communality (Affiliation): Perceived system performance (PSP) and perceived usefulness (PU). Computer Self Efficacy (CSE) was significantly correlated to PU and behavioral intention to use (BI). Computer anxiety-specific to the CBL system (CA-sp) was significantly correlated to PSP, trusting intention (TI-fa), and perceived ease of use (PEU). Perceived enjoyment (PE) and was significantly correlated ($p < .001$) to all the TAM-related variables, except computer anxiety (CA) and CSE. All of the TAM-related variables were significantly correlated to PSP, TI-fa, and PEU – except for CSE. All of the TAM-related variables were significantly correlated to perceived usefulness, including CSE – except for CA. Behavioral intention to use (BI) was significantly correlated to all of the TAM-related variables except for PEU and CA-sp. Computer self-efficacy (CSE), it should be reminded did not perform well on the reliability tests; however, it was retained for comparison purposes to another study.

Hypotheses and post hoc test revealed the following interesting and notable results.

- Regarding computer anxiety-specific to the computer-based learning system (CA-sp), while not at a significant level, the acommunal side of the IPC reported higher average CA-sp. Octant gregarious/extraverted (NO) reported significantly higher CA-sp than four octants (assertive/dominant (PA), arrogant/calculating (BC), unassertive/submissive (HI), and warm/friendly (LM)). Gregarious/extraverted's (NO) neighboring octant, warm/friendly (LM) reported low CA-sp and it was significantly lower than its opposite, cold/hostile (DE). This outcome is interesting because of the results for octant warm/friendly (LM), especially as the (LM) results are juxtaposed against its neighboring octant gregarious/extraverted (NO). A visual inspection of Illustration 6 in the Appendix, depicts that the most distinct contrast in CA-sp responses is between the gregarious/extravert (NO) participants and the warm/friendly (LM) participants. That cold/hostile (DE) would report significantly lower CA-sp was reasoned; that warm/friendly (LM) would experience/report as

³³ Correlation matrix: the following paragraph serves only to indicate significant correlations, not positive or negative directions.

low a computer anxiety-specific to the computer-based learning system was not anticipated. In hindsight, the five-factor *Conscientious* nature of the IPC' warm/friendly (LM) (Schmidt, et al. 1999) may have contributed to the low CA-sp.

- Regarding perceived enjoyment (PE), octant warm/friendly (LM) reported significantly lower PE than four octants (assertive/dominant (PA), aloof/introverted (FG), and neighboring gregarious/extroverted (NO), and unassuming/ingenuous (JK)). Dramatic drops in PE existed beside assured/dominant (PA) and arrogant/calculating, as well as from unassuming/ingenuous (JK) to warm/friendly (LM). (See Illustration 8.) This outcome is interesting because contrary to my expectations, octant warm/friendly (LM) reported the lowest PE – and warm/friendly's (LM) average PE was significantly lower than its fellow "Affiliative" (communal) octants unassuming/ingenuous (JK) and gregarious/extravert (NO). As noted earlier, the explanation for the warm/friendly (LM) octant's result might be attributed to warm/friendly's (LM) greater desire for emotional warmth.
- Regarding perceived system performance (PSP), communality was significantly and positively related to PSP. (See Illustrations 9 and 10.) This outcome is notable because it does support the hypothesis (h5a) and its rationale that communals (recall that communals are found to have 'low negative affect') give more favorable ratings of peer and others (Bass et al. 1961; Graziano et al. 1980). Thus, those who were communal (a.k.a. friendly) reported higher PSP.
- Regarding trusting intention-fa (TI-fa), contrary to my expectations, octant unassuming/ingenuous (JK) reported an average TI-fa that was only marginally above the average. (See Illustrations 17 and 18.) This outcome is interesting because octant unassuming/ingenuous (JK) is most associated with high interpersonal trust. As noted earlier, high "interpersonal trust" extended from one human to another may not translate into "impersonal" trust from one human to an object or more specifically, a CBL.

- Regarding perceived usefulness (PU), while a significant correlation did exist between PU and the octant gregarious/extraverted (NO), the relationship was the opposite of my hypothesis: octant gregarious/extraverted (NO) actually reported the lowest PU, not the highest. Interestingly, its neighboring octant warm/friendly (LM) reported the highest PU. However contrary and contradicting these outcomes are, the “interestingness” of the results is mitigated by the fact that that analyses for Perceived Usefulness failed the Levene test for homogeneity of variance ($p < 0.00$) for the communal dimension comparisons test, the quadrant-level comparisons, and the octant-level comparisons.
- Regarding behavioral intention-specific, octants aloof/introverted (FG) and gregarious/extroverted (NO) reported significantly higher BI-sp than unassured/submissive (HI) reported the lowest. This outcome is interesting, because, despite octant gregarious/extroverted (NO) reporting the lowest reported PU (see above) of the CBL system, the gregarious/extroverted (NO) still reported significantly high Behavioral Intention to use it. (See also Illustrations 15 and 16.)

For more specific summary of results for each hypothesis, see Table A9 in Appendix.

CHAPTER V

DISCUSSION AND SUMMARY

5.1 INTRODUCTION

As outlined in Chapter I, the purpose of this research was to examine the role that interpersonal traits exert on users' evaluations of information technology; more particularly, to assess the impacts that individual interpersonal traits may have on TAM-related variables. As a framework for this research, I used interpersonal theory, specifically, the interpersonal circumplex. The interpersonal circumplex arrays eight (8)³⁴ traits, equidistance around the circle, depending on their blend of the orthogonal dimensions of Agency (Dominance) and Communality (Affiliation). To help assess and differentiate the (non-business major) college student-participants along the IPC, I utilized Locke's Circumplex Scales of Interpersonal Values (Locke 2000). User *perception* is the ultimate focal point here and how perceptions (and thus evaluations) of technology may be predicted based upon the perceiver's personality.

My hypotheses may be generalized as follows: individuals who are “**acommunal**” – that is, who are less interpersonally affiliative – are likely to be more comfortable with technology and therefore possess a higher sense of computer self-efficacy, harbor less computer anxiety, and be more disposed to utilizing technology. Alternately, individuals who are “**communal**” – that is, who have a predilection for interpersonal interaction – are likely to be less comfortable with technology, hold a lower sense of computer self-efficacy (CSE), harbor more computer anxiety (CA), and be less disposed to technology. That binary either/or generalization glosses over exceptions: within divisions on the left, acommunal side, and within divisions on the right, communal side there are identifiable personality traits that may accentuate certain perceptions above and beyond others; and, similarly, there are identifiable personality traits that may make such persons exceptions to their acommunal or communal side's norm. And, such exceptions to binary or broad

³⁴ The original IPC arrays 16 traits around the circumplex. For economy, Wiggins, Trapnell, and Phillips (1988) condensed the 16 traits into 8 by combining neighboring traits. Therefore, where there was Arrogant (B) and Calculating (C), there became *Arrogant/Calculating* (BC).

partitions of personality are an additional driver for this research. Heretofore, personality research in MIS has applied psychological frameworks that are comprised of broader personality dimensions. Thatcher and Perrewé (Thatcher et al. 2002) applied Mood Model (of Affectivity) and found no correlations between Negative Affect and CA and CSE. Korukonda (Korukonda 2007) applied the Five Factor Model (FFM) and found a significant positive correlation between CA and Neuroticism, and a significant negative correlation for CA to Conscientiousness; but Korukonda did not find significant correlations for CA to the other factors (Extraversion, Openness, and Agreeableness). Results from this study (see illustrations, especially 1, 2 and 5, 6) indicate that within broad personality dimensions (i.e. Friendly-Dominant, Hostile-Submissive) are isolated responses/behaviors that appear to be attributable to a more specific personality. Such distinguishable responses to issues salient to technology acceptance are what this research intended to surface.

5.2 SUMMARY AND DISCUSSION OF RESULTS

5.2.1 Hypotheses 1a and 1b – Computer Self-Efficacy

Hypotheses 1a and 1b concerned computer self-efficacy (CSE). H1a predicted that communality would be negatively correlated to CSE. H1b predicted that aloof/introverted (FG) and cold/hostile (DE) would report higher CSE than gregarious/extroverted (NO) and unassuming/ingenuous (JK). Neither H1a nor H1b was supported. Illustrations 1 and, especially, Illustration 2 do provide us our first glimpse into the variation of responses that may occur within a side or a quadrant of an IPC. The post hoc analyses of the octants did indicate a significant difference (at $p < 0.10$) between two of the octants hypothesized: cold/hostile (DE) reported significantly *lower* CSE unassuming/ingenuous (JK). This was the *opposite* of my hypothesized relationship. Before attempting to account for this outcome, we should first review the overall pattern that shaped up at the octant level (Illustration 2). The three pyramid-like figures provide a provocative outcome. (It must first be emphasized, however, that only two points were significantly different from each other.) One may draw several interpretations. (1) The variations were random, inconsequential noise; the differences were insignificant. (2) Either one of or both of the octants

assured/dominant (PA) and cold/hostile (DE) were downplaying their capabilities, were responding self-consciously, or were making defensive responses to the CSE questions – questions which tap *one's sense of self-efficacy*. For instance, when completing the surveys the cold/hostile (DE) participants may have been responding disagreeably (that is, unauthentically). And/or the assured/dominant (PA) participants (while not business majors, but possibly most assured in their own degree areas) may have been responding self-consciously or defensively. (3) Considering the locations of assured/dominant (PA), cold/hostile (DE), unassured/submissive (HI), warm/friendly (LM) – they are each more purely along one of the two primary personality dimensions (and not a blend with the other) – draws attention to the role that agency (control) and communality (affiliation) may play. In consideration of my second (2) interpretation about assured/dominant's (PA) possible defensiveness, it is worth noting that the assured/dominants (PA) reported a lower average CSE than their counterparts, the unassured/submissives (HI), at the other end of the Agency (control) pole.

Such defensive strategizing returns me to the unexpected (reversed) relationship between cold/hostile (DE) reporting lower CSE than unassured/ingenuous (JK). I hypothesized that unassured/ingenuous (JK) would report among the lowest CSE; instead the unassuming/ingenuous (JK) reported the highest average CSE and significantly higher than the cold/hostiles (DE). Because the unassuming/ingenuous (JK) are described as being modest and without pretension, uncalculating and without guile (Wiggins 1979), I am led to either of the following interpretations: (1) the unassuming/ingenuous (JK) do possess a higher CSE relative to their counterparts (recall that I had hypothesized that they (JK's) would have among the lowest CSE); or, (2) (some of) their counterparts were responding with some guile and disingenuousness and were self-consciously reporting lower CSE than actual. In the instance of the assured/dominant (PA), however, another explanation may be available other than guile. Recall, that the IPC concerns *interpersonal* dynamics; therefore, whereas the assured/dominants (PA) project themselves as assured/dominant in interpersonal interactions with others (a maintenance of one's status), they may (self-conscientiously or not) harbor or acknowledge a lower sense of self-efficacy in areas other than their own arena of expertise (here, academic major/studies) – or their projection of

assured/dominance may be compensation or defensiveness about issues of self-efficacy. (The IPC scales (CSIV) were self-reported, as were the other TAM-related scales.)

In sum, the formal hypotheses regarding computer self-efficacy (CSE) were not supported. In fact, rather than octant cold/hostile (DE) reporting among the highest CSE, the cold/hostile (DE) octant reported a CSE that was significantly lower than unassuming/ingenuous (JK). This outcome led me to suggest one of the following explanations: cold/hostile (DE) was reporting low CSE as a defensive mechanism or cold/hostile (DE) was relatively self-critical of its CSE. Further, the seismograph-like depiction on Illustration 2 of CSE by octants, suggests how much activity may underlie a single TAM-variable average score. Though broader trait scales (e.g. Mood Model Affect and the Five Factor Model) may further our understanding of human-to-computer interaction, they, too, may mask differences underlying them.

5.2.2 Hypotheses 2a and 2b – Computer Anxiety – General; Hypotheses 3a and 3b – Computer Anxiety – Specific to the CBL

It is worth considering these hypotheses together. H2ab concerned computer anxiety in general (CA-g) and was on the initial survey administered at the first of the semester, before beginning the CBL unit. H3ab concerned computer anxiety specific to using the CBL (CA-sp) and this survey was administered subsequent to the students completing both the CBL Excel and Access units of their class. H2a and H3a predicted that level of communality was positively correlated to CA. This hypothesis was not supported for either CA-g or CA-sp. H2b and H3b predicted that octant aloof/introverted (FG) and assured/dominant (PA) would report significantly lower CA-g than the communal octants gregarious/extraverted (NO) and unassuming/ingenuous (JK). H2b was not supported. H3b, regarding CA-sp, was somewhat supported ($p < 0.10$). Restated: when the issue was CA as an abstraction (that is, not related to any specific computer experience), the reported differences were not significant; when the issue was CA in a field test with an (sometimes unstable or unpredictable) actual system, the differences became more pronounced. This change may be most attributable to the gregarious/extroverted (NO). Responding to the CA-g on the first survey, the gregarious/extraverts (NO) averaged a mean of 2.443

(sd=1.18), with an *upper* bound confidence interval of 2.966. After working with a system with which they were unfamiliar, the gregarious/extroverted (NO) responded with higher computer anxiety-specific (CA-sp) means of 3.147 (sd=1.49) and with a *lower* bound confidence interval of 2.826. The dramatic change and contrast in confidence intervals by the gregarious/extraverts (NO) was not exhibited by the other octants (see Table A7). This change exhibited by the gregarious/extraverts (NO) may be indicative of the gregarious/extraverts' (NO) predilection for optimism: for computer anxiety in the abstract (that is, general computer anxiety (CA-g)), they reported among the lowest for computer anxiety; however, after their subsequent experience with the CBL system, they reported the highest CA-specific. This CA-sp for the gregarious/extroverted (NO) was significantly higher than four other octants (assured/dominant (PA), arrogant/calculating (BC), unassured/submissive (HI), and warm/friendly (LM))! (See Illustration 6.) One of Leary's (Leary 1957) original characterizations describes gregarious/extraverts (NO) as wishing to avoid the appearance of weakness, overextending themselves, and operating as strong and conventional characters to help ward off anxiety. Arguably, on the initial CA-g assessment, the gregarious/extraverts (NO) were exhibiting both optimism and a projection of strength (and 'hypernormalcy.' Leary, 1957); and on the subsequent CA-sp survey the gregarious/extraverts (NO) may have been venting their frustration with the CBL system at the closure of the semester and exploiting the anonymity in this study. It should also be noted, however insignificant, that all of the octants reported higher CA-sp than CA-g, *except* the unassured/submissive (HI; 2.833, sd=1.478 to 2.470 sd=1.277) and the warm/friendly (LM; 2.641, sd=1.351 to 2.415, sd=1.197). See Table A7 for computer anxiety confidence intervals.

In post hoc (least squares difference) analyses, octant warm/friendly (LM) reported significantly lower CA-sp than its neighboring octants unassuming/ingenuous (JK; $\alpha < 0.01$, $p = 0.052$) and gregarious/extraverted (NO; $\alpha < 0.05$). This is a noteworthy contrast: all three octants are completely located within the right communal side of the IPC; warm/friendly (LM), however, is more exclusively along the communal dimension, not harboring the extrovert's (NO) appetite for social interaction, nor are warm/friendly (LM) submissive or in want for someone else to lead them (as is more characteristic of the unassured/submissive (HI) and unassuming/ingenuous (JK)). If those trait differences along

the continuum of Agency (Control) do not or are not enough to account for change in computer anxiety, then we may also refer to the research that maps the Five Factor Model (FFM) to the IPC. Schmidt (Schmidt et al. 1999) mapped the Conscientious factor to warm/friendly (LM) octant. Recalling from the earlier section on the FFM from Chapter II:

Conscientiousness	Scrupulousness, reflects one's thoroughness, carefulness, sense of being governed by conscience; also hardworking, ambitious, energetic, persevering (McCrae et al. 1987) (p. 88).
Facets	Competence, Order, Dutifulness, Achievement Striving, Self-Discipline, and Deliberation (Costa Jr. et al. 1991)

That the warm/friendly (LM) participants would report lower computer anxiety is consistent with the mapping of LM to the FFM factor Conscientiousness (Schmidt et al. 1999) and Korudonda's (Korukonda 2007) finding that Conscientiousness is negatively correlated to CA. Thus, the warm/friendly (LM) may also possess the characteristics that would depress computer anxiety. Looking ahead, warm/friendly's (LM) evaluations of perceived system performance (PSP) give no indication of dissatisfaction with the performance of the CBL. Thus, low computer anxiety is also not a function of PSP.

In a curious and most notable twist, whereas the assured/dominant (PA) reported the lowest computer self-efficacy (CSE) and the unassuming/ingenuous (JK) reported the highest CSE (significantly higher than cold/hostile (DE)), assured/dominant (PA) and unassuming/ingenuous (JK) responses to the CA-g questions produced mirror opposite outcomes, relative to the other octants. *While not significant*, assured/dominant (PA) reported the lowest CA-g and unassuming/ingenuous (JK) reported the highest – to reiterate, this is an inversion of their relative placements on the CSE scales. (See Illustration 2.) Recall that CSE and CA-g were both inventoried on the initial survey, administered at the beginning of the semester prior to beginning their CBL assignments. And later after the CBL assignments, on the subsequent survey, it should be remembered that the assured/dominant (PA) reported significantly lower average CA-sp than the gregarious/extroverted (NO).

Explaining the outcomes of CA-g and CA-sp, relative to their octants: as mentioned earlier some of the octants may have been understating their CSE (that is, the assured/dominant (PA) may have been 'sand-bagging' their reported CSE); here, other

octants may be underestimating their computer anxiety (or similarly, overstating their not having it). Within the framework of the IPC, the gregarious/extraverts (NO) are optimists. Does this suggest a liability with the TAM framework? That is, are gregarious/extraverts (NO) responses to TAM-related variables (including variables from extended models) misleading structural equation modeling outcomes? Most ultimately, hypothetically, would the gregarious/extraverts' (NO) endorsement of behavioral intent to use be overly optimistic? (This concern about gregarious/extroverts' over endorsement holds for PEU and PU, as well.)

In sum, trait correlations to computer anxiety were not indicated on the CA-general assessment; however, correlations were indicated by the responses given on the CA-sp (CA specific to using the CBL system) scale. Trait correlations were indicated on the post CBL task as measured with CA-sp. That correlations were not indicated with the CA-g but were indicated with the CA-sp may be attributable to the significantly different average responses given by the gregarious/extraverted (NO) on the two computer anxiety assessments. On the initial CA-g assessment, the gregarious/extraverted (NO) self-reported a low CA; on the subsequent CA-sp, the gregarious/extraverted (NO) reported the highest CA-sp (it was significantly higher than four octants; more notably, it was significantly higher than their initially reported CA-g). Among the issues that this contrast raised was the gregarious/extraverts' (NO) predilection for projecting optimism and strength (as seen on the CA-g). The discrepancy from the initial CA-g survey and the subsequent CA-sp survey also raised the potential concern for the validity of gregarious/extraverts' (NO) endorsements regarding new technology implementation. Gregarious/extraverted (NO) reported higher CA-sp than its neighbor warm/friendly (LM); it may also be noted that warm/friendly (LM) reported significantly lower CA-sp than its other neighbor, unassuming/ingenuous (JK). (See Illustration 6.) This outcome suggested that the FFM factor Conscientious may serve to reduce the anxiety experienced by warm/friendly (LM) in contrast to its neighbors unassuming/ingenuous (JK) and gregarious/extraverted (NO).

5.2.3 Hypotheses 4a and 4b: Perceived Enjoyment

Hypothesis 4a and 4b concerned perceived enjoyment (PE). H4a predicted that PE would be positively correlated to the Communal axis. H4b predicted that gregarious/extroverted (NO) and warm/friendly (LM) would report higher PE than cold/hostile (DE) and aloof/introverted (FG). Neither H4a nor H4b was supported. In fact, rather than warm/friendly (LM) reporting the significantly higher PE, warm/friendly (LM) reported the lowest PE; and, it was an average PE which was significantly lower than four octants, two of which were warm/friendly's (LM) two neighboring octants, unassuming/ingenuous (JK) and gregarious/extroverted (NO). (See Illustration 8.) That the warm/friendly (LM) would report the lowest PE of using the CBL system was, obviously, unexpected by me. These outcomes are seemingly more incongruent in light of these octant's computer anxiety-specific scores. Warm/friendly (LM) reported the lowest CA-sp, while its same neighboring octants unassuming/ingenuous (JK) and gregarious/extroverted (NO) reported significantly higher CA-sp. One would expect that the perceived enjoyment would be negatively related to computer anxiety (CA-sp). (Their relationship, instead, was insignificantly positive (Table A5).)

This outcome, however, may be explainable by an additional look at Wiggins et al. (Wiggins 1979) taxonomy of traits. "Warm" (L) is subtitled 'Love' and is characterized by the following: tenderhearted, gentlehearted ... emotional, sympathetic, softhearted (p. 405). Whereas, when formulating my rationale, I may have been focusing on the essence of the trait warm/friendly (LM) qualities *tender, kind, charitable, courteous, cooperative*, etc. and anticipating a generous evaluation from warm/friendly (LM) - what I may have overlooked was how warm/friendly (LM) seeks emotional warmth as much as he or she personifies it. Therefore, while the warm/friendly (LM) may be conscientious, competent, and dutiful, when it comes to actual *personal* enjoyment, he or she may prefer an experience with more emotional resonance. The CSIV affirms. Pertinent questions from the CSIV focus more on tenderhearted characteristics than aspects of charity, courteous, and cooperative:

- 3. When I am with him/her/them, it is... 0 1 2 3 4 ...that I feel connected to them
- 11. When I am with him/her/them, it is... ..that they support me when I am having problems
- 19. When I am with him/her/them, it is... ..that they come to me with their problems
- 27. When I am with him/her/them, it is... ..that they show concern for how I am feeling

In sum, the hypotheses, regarding perceived enjoyment (PE) were not supported. Post hoc analyses, however, again indicated how octant warm/friendly (LM) can be an exception between its two neighboring octants unassuming/ingenuous (JK) and gregarious/extraverted (NO). Warm/friendly (LM) reported significantly lower perceived enjoyment than four octants (assertive/dominant (PA), aloof/introverted (FG), unassuming/ingenuous (JK), and gregarious/extroverted (NO)). This outcome for warm/friendly (LM) may be a function of warm/friendly's preference for emotional, nurturing interactions. The CBL does not provide this.

5.2.4 Hypotheses 5a and 5b: Perceived System Performance (PSP)

Hypotheses 5a and 5b concerned the perceived system performance (PSP) of the CBL. H5a predicted that participants' level of communality would be positively correlated to PSP. H5b predicted that gregarious/extraverted (NO) and warm/friendly (LM) would report higher PSP than cold/hostile (DE) and aloof/introverted (FG). H5a was *somewhat* supported ($p < 0.10$). (A simple t-test comparing the acommunal to communal (rather than a regression using both agency and communality) indicated a significant difference ($p < 0.05$).) H5b was not supported. While post hoc analyses, at $\alpha < 0.10$, indicated significant differences between the low reported PSP of arrogant/calculating (BC) and high PSP responses of octants unassuming/ingenuous (JK) and warm/friendly (LM). A review of Illustration 10 and the outcome of H5a suggest the critical or analytical difference between the acommunals and communals. The questions are, however, is one side providing a more accurate assessment of PSP than the other? And, if so, which? I submit that it would be *moderate* acommunals, reasoning as follows: recall that the left, acommunal, side of the IPC maps more generally to 'Negative Affect' (of the Mood Model; see Chapter II, section 2.2.0 for more discussion of this). Mood model research indicates that low-negative affect individuals give more favorable ratings of peer and others ratings (Bass et al. 1961; Graziano et al. 1980) and "eschew the ruthless honesty of high-NA individuals" (Watson et al. 1984a) (p. 484). I qualified the acommunals as '*moderate*,' because additional Mood Model research suggests that individuals high in NA dwell upon

and magnify mistakes (Watson et al. 1984a). (See Chapter II, section 2.2.2 for more discussion.)

In sum, the hypothesis 5a, regarding perceived system performance (PSP) was somewhat supported, indicating that the level of communality is correlated to PSP. While h5b — predicting cold/hostile (DE) and aloof/introverted (FG) to be significantly higher than gregarious/extroverted (NO) and warm/friendly (LM) — was not supported, octant arrogant/calculating (BC) did report, at $\alpha < 0.10$, significantly lower PSP than octants unassuming/ingenuous (JK) and warm/friendly (LM). (See Illustration 10.)

5.2.5 Hypotheses 6a and 6b: Trusting Intentions (fa) (TI-fa)

Hypotheses 6a and 6b concerned trusting intentions (TI) *as a subjective probability of depending* on the CBL system in the future. H6a predicted that participants' level of communality was positively correlated to TI-fa. H6b predicted that unassuming/ingenuous (JK) and warm/friendly (NO) would report higher average TI-fa than arrogant/calculating (BC) and cold/hostile (DE). Neither hypothesis was supported. While the difference was not significant, the Communal pole did show higher TI-fa. H6b was predicated on the interpersonal research that identifies octants arrogant/calculating (BC) and unassuming/ingenuous (JK) as being most associated with distrust and trust. (Gains Jr. et al. 1997; Gurtman 1992b) Interestingly, and unexpectedly, both octants (BC and JK) reported relatively lower TI-fa. Post hoc analyses indicated no significant differences between octants. That the octant associated with interpersonal trust — unassuming/ingenuous (JK) — would *not* report among or the highest trust surprised me. Looking at it in hindsight, however, provides a possible explanation. Similar to the issue of octant warm/friendly (LM) (where it reported the lowest perceived enjoyment, rather than the highest PE), the explanation here with TI-fa may lay in the difference between impersonal versus interpersonal. Unassuming/ingenuous (JK) is associated with being most *interpersonally* trusting of others. A look at Illustration 18 suggests that such interpersonal trust is not extended into the realm of information systems. Arrogant/calculating (BC), however, still appears to be in character — that is, distrusting. But, again, differences between traits were not significant.

In sum, the hypotheses were not supported: neither is trusting intentions (TI-fa) appear related to level of communality, nor are their significant differences reported between the communal unassuming/ingenuous (JK) and warm/friendly (NO) octants and the acommunal arrogant/calculating (BC) and cold/hostile (DE) octants.

5.2.6 Hypotheses 7a and 7b: Perceived Ease of Use (PEU)

Hypotheses 7a and 7b concern perceived ease of use (PEU) with the CBL system. H7a predicted that participants' level of communality was negatively correlated to PEU. H7b predicted that aloof/introverted (FG) and cold/hostile (DE) would report higher average PEU than gregarious/extraverted (NO) and warm/friendly (LM). Neither hypothesis was supported. A simple t-test comparing acommunal to communal indicated that those scoring on the acommunal pole reported significantly higher PEU than those on the communal pole. It is this type of finding with the t-test that supports my overall implicit hypothesis that those on the acommunal side of the IPC are more disposed to technology. H7b might be said to have *somewhat partial* support: decoupled from aloof/introverted (FG), octant cold/hostile (DE) does report significantly higher PEU (at $\alpha < 0.10$) than gregarious/extraverted (NO) and warm/friendly (LM). In addition, post hoc (LSD) indicated that cold/hostile (DE) reported significantly higher PEU than its opposite warm/friendly (LM), which report the lowest.

Returning for a moment to the first hypothesis concerning computer self-efficacy (CSE), cold/hostile (DE) was predicted to report high CSE, but instead cold/hostile (DE) reported among the lowest CSE and significantly lower than unassuming/ingenuous (JK). Here, on the issue of PEU, however, cold/hostile (DE) reported the highest average perceived ease of use (PEU), and it was significantly higher than warm/friendly (LM) and gregarious/extraverted (NO). Such response averages for PEU in light of initially reported CSE seem contradictory³⁵. The two most immediate explanations are the following: (1) the CSE scale demonstrated poor reliability, and, as a result, it produced confounding output; (2) octant cold/hostile (DE) was 'sand-bagging' it on the CSE survey; the cold/hostile (DE)

³⁵ Contradictory? It may be noted, however, that unassuming/ingenuous (JK) had also responded in a similar contradictory manner. Unassuming/ingenuous (JK) initially had reported the highest general CSE (and significantly higher than cold/hostile (DE) and yet the unassuming/ingenuous (JK) subsequently reported among the lowest average PEU's.

possessed more CSE than they were admitting. The results for cold/hostile (DE) concerning PEU does correspond with research on the RIASEC Preferred Occupations Scale: Realistic types are mechanical/technical “things-people” and Realistic types map to the cold/hostile (DE) and aloof/octant (FG) interpersonal circumplex octant areas (Schneider et al. 1996).

Post hoc analysis (LSD) indicated that cold/hostile (DE) was only significantly higher than warm/friendly (LM) its polar opposite. A review of Illustration 12 shows us what an apparently unique spike the evaluation by cold/hostile (DE) is. This finding, again, suggests the ability of using the IPC to differentiate users into meaningful subgroups with which one may be able to make particular predications about their responses to IT questions; provided such a spike is also evident in subsequent studies, it will provide greater support for differentiating user's into octant subgroups.

In sum, neither hypothesis was supported; however, a simple t-test comparing the average PEU reported by the acommunals to the average reported by the communals did indicate a significant difference. The acommunals reported higher average PEU. As Illustration 12 indicates, much of that difference appears attributable to octant cold/hostile (DE). Hypothesis 7b was, in fact, *partially supported*, octant cold/hostile (DE) by itself (that is, uncoupled from octant aloof/introverted (FG) as originally hypothesized; and at $\alpha < 0.10$) did report significantly higher PEU than octants gregarious/extraverted (NO) and warm/friendly (LM).

5.2.7 Hypotheses 8a and 8b: Perceived Usefulness (PU)

Hypotheses 8a and 8b concerned perceived usefulness (PU) of the CBL system. H8a predicted that participants' level of communality was positively related to the level of reported PU. H8b predicted that gregarious/extraverted (NO) would report significantly higher PU than unassured/submissive (HI) and aloof/introverted (FG). H8a was supported. H8b was not supported. Because PU violated the Levene test for homogeneity of variance on all three levels (communal dimension, quadrant, and octant), we should use caution in interpreting the results. Regressing Agency and Communality on PU produced the following equation: predicted PU is equal to $3.287 + -0.115 (\text{Agency}) + 0.082 (\text{Comm})$,

when PU is measured on a 1-7 Likert scale and the IPC is measured with the CSIV (32 question short-form; Likert 0-4). Therefore, while level of communality was positively linked to PU, PU, evidently, is more negatively linked to agency; however, the table of coefficients indicated that Communality is more significant ($p=0.065$) than Agency ($p=0.124$). With an R-square of 0.027, the percent explained is minimal. With a variance that violates the Levene test, the certainty of these results also is minimal.

Providing a rationale for the results of perceived usefulness (PU) presents a challenge. My rationale for the hypotheses was predicated on the Mood Model's mapping to the IPC, with Positive Affect (and optimism) mapping to the Northwest IPC Quadrant IV, Friendly-Dominant; and Negative Affect (NA) mapping more generally to the left acommunal side of the IPC (arrogant/calculating (BC), cold/hearted (DE), aloof/introverted (FG)). As noted earlier, high-NA individuals may be more ruthlessly honest in their appraisals than low-NA's (Watson et al. 1984a) (p. 484). Octants arrogant/calculating (BC), cold/hearted (DE), aloof/introverted (FG) (along with assertive/dominant (PA)) responded most similarly to the PU questions. Were they all (BC, DE, FG) being collectively ruthless or were they all evaluating with the same honesty? Given their participant numbers ($31+59+24 = 114$; nearly half of all participants), one inclines towards the latter – they were evaluating with the same honesty. Lower confidence interval bounds were 2.74, 2.275, 2.73, respectively; the lower confidence interval bounds for the communal side were 2.68, 3.23, and 2.50; the average lower confidence interval bound for the octants other than (BC, DE, FG) was 2.74. It appears that the three acommunal octants (arrogant/calculating (BC), cold/hostile (DE), aloof/introverted (FG)) were evaluating consistently and reasonably. Further support for this comes from regressing the average perceived ease of use (PEU) responses of (BC, DE, FG) upon their PU responses. (PEU is a predictor of PU.) Collectively, the three average PEU responses regressed significantly on PU ($p<0.05$); individually, arrogant/calculating (BC) and cold/hostile (DE) regressed significantly on PU.

Comprehending what occurred on the communal side is the larger part of the challenge. Unassured/submissive (HI) responded far more positively, regarding PU than anticipated, and gregarious/extravert (NO) responded far more cynically. (See Illustration 12.) This is evidence by gregarious/extravert (NO) reporting the lowest average PU, an

average which was significantly lower ($p < 0.10$) than unassured/submissive (HI), as well as unassuming/ingenuous (JK). Therefore, my predictions concerning unassured/submissive (HI) and unassuming/ingenuous (JK) were not just off but backwards. In regards to PEU predicting PU responses, as far as octants unassured/submissive (HI) and unassuming/ingenuous (JK), such a prediction would have been off, as well. Regressing the average PEU of unassured/submissive (HI) and unassuming/ingenuous (JK) on their PU scores did not produce significance; neither did individual regressions. (Recall that regressions for arrogant/calculating (BC) and cold/hostile (DE) were significant.) Therefore, in the instance of this study, these two octants (unassured/submissive (HI) and unassuming/ingenuous (JK)) appear to have been inconsistent with regards to PEU influencing PU.

The regression of PEU on PU raises a (few) question(s). For the sample as a whole, the regression was significant ($p < 0.001$, $R\text{-square} = 0.093$). As shown above, partitioning this regression suggested some differences by octant. The Northwest, Hostile-Dominant Quadrant I, octants assured/dominant (PA, #1), arrogant/calculating (BC, #2), cold/hostile (DE, #3) regressed significantly ($p = 0.009$, 0.009 , 0.019 , respectively). The only other octant to regress significantly was warm/friendly (LM, #7) ($p = 0.004$)³⁶ which is directly across from cold/hostile (DE). It is worth remembering that warm/friendly (LM), which maps to FFM Conscientious (Schmidt et al. 1999), reported the following: a CA-sp that was significantly higher than cold/hostile (DE); a PE that was significantly lower than unassuming/ingenuous (JK); a PSP that was significantly higher ($p < 0.10$) than arrogant/calculating (BC); the lowest TI-fa – although not significantly; a PEU that was significantly lower than cold/hostile (DE); and a PU that was significantly higher than cold/hostile (DE) and gregarious/extroverted (NO).³⁷ Thus, in spite of reporting high CA, low PE and PEU, warm/friendly (LM) might be said to be unbiased in its assessment of PSP and PU.³⁸

In light of this – that overall, PEU regressed significantly on PU, but that only half of the octants respectively indicated significant regressions (three of the four at $p < 0.001$) – what questions does this raise about the TAM? In regards to the TAM being explicated by

³⁶ Octant warm/friendly (NO) average participant $PU = 2.470 + 0.571(PU)$; $R\text{-square} = 0.185$.

³⁷ See footnote above.

³⁸ Reminder, IPC octant warm/friendly (LM) maps to FFM factor Conscientiousness (Schmidt et al. 1999).

structural equation modeling, we may ask are certain respondents (that is, octant group(s)) responding so differently to survey questions that they are exerting an exceptional biasing of the regression weights between PEU and PU? If survey respondents can be segregated based on traits, could there be changes to the way implementation decisions would be made?

In sum, H8a, regarding perceived usefulness (PU) was supported: the level of communality was positively correlated to reported (PU). H8b was not supported. Not only did gregarious/extraverted (NO) *not* report a PU higher than aloof/introverted (FG) and unassured/submissive (HI), but gregarious/extraverted (NO) reported an average PU that was significantly lower than aloof/introverted (FG). The Levene test for homogeneity was violated on all three levels (dimension, quadrant, and octant), therefore caution should be used in interpreting these results. The reported difference in PU between the acommunals and the communals raised the question, which octants perceive the usefulness of the CBL more accurately?

5.2.8 Hypotheses 9a and 9b: Behavioral Intention to Use the CBL in the Future (BI-sp)

Hypotheses 9a and 9b concerned behavioral intention to use this specific CBL system (BI-sp) in the future provided that the participant still had access to it. H9a predicted that the participants' level of communality was negatively related to the level of reported BI-sp. H9b predicted that aloof/introverted (FG) and gregarious/extraverted (NO) would report higher average BI-sp than unassured/submissive (HI). H9a was not supported. H9b was supported. Regarding H9a, acommunal octants (including octant assertive/dominant (PA) but not unassertive/submissive (HI)) reported average BI's that were higher than the communal octants (including octant unassertive/submissive (HI) but not octant gregarious/extraverted (NO)). The anomalous octant gregarious/extraverted (NO) was, in fact, second highest in BI-sp and, at $\alpha < 0.10$, it reported significantly higher BI-sp than aloof/introverted (FG) ($p = 0.051$) and warm/friendly (LM) ($p = 0.054$). The rationale for these results, ideally, is that the octants (FG, NO, HI) behaved as were originally rationalized: aloof/introverted (FG), as per RIASEC, as *Realistic*, prefers and

technical endeavors and ‘things;’ gregarious/extraverted (NO) may have endorsed BI due to a combination of their enthusiasm to *jump into action*, *optimism* (Kiesler 1985), *openness to new ideas* (Hmel & Pincus, 2002), and their *Responsible-Hypernormal(-ism)* as Leary (Leary 1957) had originally characterized them. Or, as Costa and McCrae (Costa Jr. et al. 1984b) suggested maybe the gregarious/extroverted (NO) endorsed BI-sp to use the CBL product because of *their enthusiasm to endorse*. Similarly, unassured/submissive (HI) may not have endorsed BI-sp, keeping in character with their interpersonal adjectives (i.e. lazy, self-doubting, meek). Octant cold/hostile (DE), the first alternative to gregarious/extraverted (NO) as my anticipated second highest average BI-sp, responded most closely to aloof/introverted (FG) and gregarious/extraverted (NO).

In sum, h9a was not supported: the level of communality was not significantly negatively related to behavioral intention to use (BI). Hypothesis 9b was supported, octants aloof/introverted (FG) and gregarious/extraverted (NO) reported significantly higher BI-sp than octant unassured/submissive (HI). The octants behaved as rationalized. Octant cold/hostile (DE) reported a PU that was close to aloof/introverted (FG) and gregarious/extraverted (NO).

5.3 SUMMARY STATEMENT

Of the eighteen hypotheses, four to five³⁹ received some level of support.

1. **Hypothesis 3b_CA-sp:** octants aloof/introverted (FG) and assured/dominant (PA) did report significantly higher CA-sp than gregarious/extraverted (NO) and warm/friendly (JK).
2. **Hypothesis 5a_PSP:** at $\alpha < 0.10$, participants' level of communality was positively related to their PSP.
3. **Hypothesis 7b_PEU:**⁴⁰ if octant aloof/introverted (FG) was decoupled from the contrast, then at $\alpha < 0.10$, cold/hostile (DE) reports significantly higher PEU than gregarious/extraverted (NO) and warm/friendly (LM).
4. **Hypothesis 8a_PU:** participants' level of communality was positively related to their PU.
5. **Hypothesis 9b_BI:** octants aloof/introverted (FG) and gregarious/extraverted (NO) reported higher BI than unassured/submissive (HI).

³⁹ H7b_PEU in its entirety was not supported, but decoupling one octant from the contrast changed the outcome.

⁴⁰ See above, H7b_PEU.

Where regression analysis did not indicate a significant correlation to the communal dimension, on two occasions, follow-up simple t-tests did.

1. **Hypothesis 5a_PSP:** a simple t-test comparing acommunal to communal responses indicated significance, where the regression of Agency and Communality did not.
2. **Hypothesis 7a_PEU:** a simple t-test comparing acommunal to communal responses indicated significance, where the regression of Agency and Communality did not.

The above results – as well as the post hoc analyses – indicate support for my overarching hypotheses. My overarching hypothesis was that those who are low along the Communal dimension (that is, they are along the acommunal vector) would have a greater self-efficacy, lower anxiety, and higher affinity for technology. As a result of these dispositions, the acommunals, in general, would report more positively about technology use. The acommunals would simultaneously be inclined, however, to be more critical about technology than the communals. The above results along with post hoc analyses indicate some support for the overarching hypothesis. Regarding computer anxiety-specific to the CBL system (CA-sp), H3b supported the notion of higher CA on the communal side and post hoc indicated that gregarious/extraverted (NO) reported higher CA-sp than three acommunal octants (as well as its (NO's) neighboring octant warm/friendly (LM)). Regarding perceived system performance (PSP), the level of communality was positively related to PSP, thus the less communal (or more acommunal) the participant, the lower the reported PSP. This finding on PSP is interesting, because it raises the following questions: were acommunals being exceptionally or unreasonably more critical than the communal? Or, were the communals being excessively less critical than the acommunals? Regarding perceived ease of use (PEU), by looking at *Illustration 10*, one can discern that octant cold/hostile (DE), in relation to the other octants, was exceptionally favorable of the PEU of the CBL system. Regarding perceived usefulness (PU), regression analysis indicates that level of communality is positively correlated to PU, furthermore *Illustration 12* visually supports the outcome and depicts octant gregarious/extravert (NO) as a dramatic exception. Regarding behavioral intent (BI) to use the CBL, data analyses indicate that level of

communality is not a clear indicator of participants' BI. While the h9b was supported, it along with *Illustration 14* does not unquestionably support the overall hypotheses.

Three of the hypotheses tests indicated, at least, a partial reversal of the relationship that I had predicted.

1. **Concerning Computer Self-efficacy (CSE)**, octant cold/hostile (DE) reported a *lower* CSE than unassuming/ingenuous (JK) – this was an outcome that I had suggested, among other things, may be a function of the following: the cold/hostiles' (DE) self-consciousness (whereas they are technical/mechanical,⁴¹ these non-business majors may not be as proficient with MS applications as they would want to be; or, alternatively, the cold/hostiles (DE) may evaluate their sense of computer self-efficacy more critically than others); the cold/hostiles (DE) were 'sand-bagging' it, defensively reporting lower CSE than their actual; or, more simply, the octant outcomes may reflect an exceptional influence on CSE due to greater alignment with one dimension (e.g. Control) or another (e.g. Affiliation).
2. **Concerning Perceived Enjoyment (PE)**, warm/friendly (LM) reported the *lowest* PE and not a higher PE – an outcome that I attributed to the CBL lacking the emotional component that may be a requisite for warm/friendly (LM) personal enjoyment.
3. **Concerning Perceived Usefulness (PU)**, it was unassuming/ingenuous (JK) – *not* the gregarious/extraverted (NO) – who reported the significantly higher PU of the two. This was an outcome that I rationalize as being an indicator of gregarious/extraverted (NO) and unassuming/ingenuous (JK) being inconsistent in their responses. (For instance, regressing the gregarious/extraverted (NO) and unassuming/ingenuous' (JK) perceived usefulness on behavioral intention was not significant (as others' structural equation modeling of the TAM suggest it should be); in contrast, however, other octants' (assertive/dominant (PA),

⁴¹ "technical/mechanical" with regards to IPC mappings to the RIASEC preferred occupations scale.

arrogant/calculating (BC), cold/hostile (DE), and warm/friendly (LM)) regressions of PU on behavioral intent were significant.)

At this point, the above results may indicate the following: cold/hostile (DE) types may be more self-critical of their CSE; warm/friendly (LM) types may perceive enjoyment of technology quite differently than their communal neighbors; and, the unassuming/ingenuous (JK) and gregarious/friendly (NO) types may be exceptions to prior research that indicates that PU loads on behavioral intent.

This study represents one of the first efforts to apply the Interpersonal Circumplex (IPC) to the understanding of human-to-computer interaction, and, more specifically, to understanding user responses to TAM-related variables. As such, it also represents an exploratory investigation, as well, into the existence of hypothesized relationships. As a consequence of this being an exploratory investigation, I have accepted the liberal standards of Fisher's LSD to help indicate significant relationships (Longnecker 2007). The two most significant and universal dimensions in personality are Agency (Control) and Communality (Affiliativeness). On one level, I framed my research in terms of Communality's influence on the user's perception of IT (e.g. level of communality was hypothesized to positively correlate to PSP). On the other, I framed my research in terms of the eight (8) traits, as defined by the Interpersonal Circumplex (IPC) and measured with Locke's CSIV (Locke 2000) (e.g. octants (FG) and (PA) were hypothesized to report lower CA-sp than octants (NO) and (JK)).

While most of the hypotheses were not supported, the outcomes of the follow-up analyses, as illustrated at the octant level, depicted a number of notable phenomena as they relate to user trait-groups' average responses to the TAM-related variables. (For instance, octant warm/friendly (LM) reported significantly lower computer anxiety-specific to the CBL-system than its neighboring octants unassuming/ingenuous (JK) and gregarious/extraverted (NO); as well, octant warm/friendly (LM) reported significantly lower perceived enjoyment than its neighboring octants unassuming/ingenuous (JK) and gregarious/extraverted (NO)). Therefore, it may be argued that using the Interpersonal Circumplex (IPC) may better help distinguish technology users for purposes of human-to-computer research than other broad personality measures (e.g. Five Factor Model). By

illustrating and comparing octant level outcomes to quadrant level outcomes, this research suggested how broader personality measures can miss what is taking place at the more ‘granular’ IPC octant level.⁴²

Relationships and lessons learned. **Firstly**, while there existed but one significant difference at the octant level, the startling seismograph-like outcome of the 8-trait responses indicates just how much activity potentially can underlie one broad measure; further, the 8-trait responses indicate that the underlying activity may have a discernable pattern (see Illustrations 1 and 2). Indicative of this trait-embedded potential and discernability is CA-sp (see Illustrations 5 and 6). On the quadrant level, CA-sp for the Northwest Quadrant IV (Friendly-Dominant) the average CA-sp is 2.951 and happens to be the highest CA-sp (though not significantly). Quadrant IV seen on the octant level (that is, the Friendly-Dominant half of warm/friendly (LM), gregarious/extroverted (NO), and the Friendly-Dominant half of assertive/dominant (PA)), reveals CA-sp averages of 2.414 (LM), 3.417 (NO), and 2.546 (PA). Gregarious/extravert (NO), as it turns out had the *highest* average CA-sp and warm/friendly (LM) had the *lowest* average of all the octants! Such a dichotomy can be masked by broad based personality measures (i.e. Mood Model and Five Factor Model, but here the ‘broad measures’ are represented as quadrant-level measures). This phenomenon is, again, manifested with perceived enjoyment (PE) (see Illustrations 7 and 8), and especially with perceived ease of use (PEU) (see Illustrations 11 and 12).

Secondly, we see signs that gregarious/extroverted (NO) is somewhat given to extremes. This is comparison of general computer anxiety (CA-g: that is, CA as an abstract, not specifically directed towards a particular program) and computer anxiety specifically reflecting participants’ experience with one program (CA-sp), indicates a significant difference ($t=-2.660$, $df=21$, $p<0.05$; paired samples test) between gregarious/extroverts’ (NO) average CA-g in the abstract and their average CA-sp after having experienced an actual CBL. This significant change is possibly our first indicator of the gregarious/extravert’s optimism (or optimistic strength, which subsequently and

⁴² IPC distinctions: As first formulated by Leary and the Kaiser Foundation (1957) and in its complete form, the IPC differentiates personalities into 16 different traits. Here, of course, we used the more conventional 8-trait blend.)

sobering encounters an implementation of an information system). Another curious contrast comes from the juxtaposition of gregarious/extrovert's (NO) significantly low perceived usefulness (PU) response (compared to aloof/introverted (FG) and unassertive/submissive (HI), $p < 0.10$) and their significantly high endorsement of BI-sp (compared to HI, $p < 0.10$). Ergo, one could imagine an ominous IS implementation for an office full of gregarious/extroverts (NO): despite their collectively low regard for its PU, they all endorsed it! Two explanations for gregarious/extroverts' (NO) extremes: one is their characteristic optimism and second may be their wanting to project strength. As stated earlier, Leary's (Leary 1957) characterized the gregarious/extroverts (NO) as wishing to avoid the appearance of weakness, overextending themselves, and operating as strong and conventional characters to ward off anxiety.

Thirdly, in addition to the relative reversal of gregarious/friendly (NO) from pre-CBL low computer anxiety-general to post-CBL high computer anxiety-specific, there were other reversals or unanticipated trait response outcomes. A few involve warm/friendly (LM) participants who straddle the communal vector, thus reflecting little attitude on the Agency (or Control) dimension. Warm/friendly (LM) maps to the Conscientious factor of the FFM (Schmidt et al. 1999). A surprising reversal-of-expectation-discovery was cold/hostile's (DE) higher CA-sp than its octant opposite warm/friendly (LM). (Later, both would endorse Behavioral Intent to use the system in the future.) The warm/friendly (LM) octant, also unexpectedly, reported the *lowest* perceived enjoyment; this was significantly lower than its neighboring unassuming/ingenuous (JK) and gregarious/extroverted (NO), two octants which reflect some blend of submission or dominance, respectively. A takeaway lesson from this research (when formulating hypotheses) is to be mindful that the interpersonal traits behaviors that manifest with other humans may not necessarily surface with technology. Warm/friendly (LM) may not have extended its characteristic *kindness, sympathy, and charity* to the perceived enjoyment evaluation, because the CBL lacked an emotiveness or, more bluntly, a soul. This lesson is reinforced on the trusting intentions-fa component of the survey. Arrogant/calculating (BC) and unassuming/ingenuous (JK), octant opposites, are both characterized by interpersonal trust: towards interpersonal others, arrogant/calculating (BC) is untrusting and unassuming/ingenuous (JK) is trusting. While no significant differences existed for TI-fa on the octant level, arrogant/calculating (BC)

and unassuming/ingenuous (JK) both averaged among the lowest four octants. (Meanwhile, assertive/dominant (PA) and gregarious/extroverted (NO), the optimist, scored among the highest.) What might account for unassuming/ingenuous (JK) reporting a low trusting (of the CBL system) score? Possible, because the interacting ‘other’ is not a person but an object.

5.4 IMPLICATIONS FOR FUTURE RESEARCH

Enhancements that I would make to this study itself include the following: (1) Given that this research uses non-business majors, in my survey I would collect participant majors, as well as their age. This would permit correlation analysis of trait-types to majors. This would also permit the same analysis when conducting this research with business majors (Accounting, Finance, Management, MIS, etc.). (2) Two TAM-related variables that presented certain disappointments were computer self-efficacy (CSE) and trusting intentions (TI). Either a different scale must be identified or a new one, possibly more salient to this CBL task, should be devised. Trusting intention (TI) was originally going to be measured with two separate but complementary trust measures from the same theorists (McKnight et al. 2002). One of the trust measures TI-gn was intended to measure *willingness to depend*; however, the reliability assessed on it was poor; therefore, as with the CSE scales, a new or different approach to measure trust seems warranted. Along those lines, I would suggest including an input box on the survey that invited participants to express why they recorded their perceived trust in the system as they did. (3) Given the interest in computer anxiety (CA), as well as the unexpected and interesting results that were seen on the CA-g and CA-sp survey components, I would revisit how these surveys are administered and/or phrased. For the CA-g, I would suggest incorporating two sets of questions: one that asks the participant to rate his or her CA-g, and another set that asks the participant to consider how others might rate his (our participant’s) CA-g, as well as his or her computer self-efficacy (CSE). The rationale for this is the confidence, or lack of, that I had in how some trait-groups were scoring themselves on CSE and CA-g – in particular the assured/dominants and cold/hostiles. In tandem with this, in addition to administering CSE and CA-g scales at the first of the course/semester, I advocate administering CSE and CA-g

surveys at the end, and, if feasible, one during the middle of the course. For insight into possible training enhancements, it would be of interest to see if and how the different trait-groups may evolve with regards to their CA-g and CSE.

Considerations for other related studies include the following: (1) In this study, the data indicated certain dramatic changes from one octant to a neighboring other. In a few instances, such as with perceived ease of use (PEU) and perceived enjoyment (PE), there were surprising ascents or descents occurring with a middle octant between its two neighboring octants (e.g. warm/friendly (LM) perceived significantly lower enjoyment than unassuming/ingenuous (JK) and gregarious/extraverted (NO)). In light of this, I would urge that in subsequent studies, such juxtapositions as were witnessed here be treated as planned contrasts. Should such phenomenon persist, they should be accorded additional attention. For instance, invite back those participants whose octant TAM-variable scores were dramatically different from the other octants and conduct qualitative interviews. Such interviews may illuminate the reasons for such significant differences in perception between the neighboring octants. (2) Similarly, gregarious/extravert (NO) presented significantly different CA-g and CA-sp. Should this replicate in similar studies, the behavior would be of particular interest for training and implementation considerations. And, to revisit an earlier suggestion, observing if and how the computer anxiety of gregarious/extraverts evolve over the course of a semester class also would be of interest to technology implementation stakeholders. It would be interest for the same reason that the gregarious/extraverts tend to endorse more optimistically than reason would warrant. Recall the significantly low perceived usefulness assigned to the CBL by the gregarious/extroverts (NO), but, yet, they subsequently responded with a significantly high behavioral intent to use the CBL in the future. The gregarious/extraverts warrant additional study. (3) Although implicitly expressed above, I would duplicate this study: in the same demographic to confirm replication with homogeneous samples; in different college demographics to assess scope among heterogeneous peer groups; and with a more mature populations and/or in industry. (4) Given how much of my rationales were predicated on related research conducted using the Five Factor Model and the RIASEC Preferred Occupation Scale, I would encourage that similar, if not parallel research be conducted

utilizing those personality measures. Such research would certainly complement this research and generate further insight.

A final consideration for future research provides a segue to implications for practice: exploration of which trait-groups provide a more significant, explanatory, and consistent progression through the traditional technology acceptance model (TAM). – from PEU to BI, from PEU thru PU to BI, and most importantly from PU to BI. Structural Equation Modeling has helped inform a number of studies, concerning the influence of different variables relating to the traditional TAM model. Discovering if and which trait-group(s) provide the most *reliable* influence on BI should be a goal. Conversely, realizing which trait group(s) provides the least significant influence and thus the most ‘noise’ in a sample could be a similar, alternate accomplishment towards the same goal.

5.5 IMPLICATIONS FOR PRACTICE AND RECOMMENDATIONS

Input and decisions concerning implementation: Who is right? Whom do you trust? Who will trust whom? Given the variety of perceptions that collectively influence the variables and weightings of the TAM model, a helpful question to answer is, are certain perceptions more accurate and reliable than others? This is critical. As much as it is vital to a prudent and successful implementation, it can also be critical to an efficient and economic execution of systems analysis and design. Given feasibility and efficacy issues, who are the most qualified people to include on the SAD team? Who are the most reliable individuals to gather input from, regarding the existing “as-is” systems, identifying needed changes, feasibility input, suggesting requirements for enhancements or a new system, assessing prototypes, evaluating *perceived ease of use*, indicating *perceived usefulness*, and expressing *behavioral intention to use*?

An issue is, are certain groups (or trait groups) providing a more accurate assessment than the other? And, if so, which? I submit that it would be the moderate acommunals, my reasoning is as follows: recall that the left, acommunal, side of the IPC maps more generally to ‘Negative Affect’ (of the Mood Model; see Chapter II, section 2.1 for more discussion of this). Mood model research indicates that low-negative affect individuals give more favorable ratings of peer and others ratings (Bass et al. 1961;

Graziano et al. 1980) and “eschew the ruthless honesty of high-NA individuals” (Watson et al. 1984a) (p. 484). I qualified the acommunals as ‘moderate,’ because additional Mood Model research suggests that individuals high in NA dwell upon and magnify mistakes (Watson et al. 1984a). (See Chapter II, section 2.2 for more discussion.)

5.6 LIMITATIONS

Threats to external validity may stem from my efforts to normalize the interpersonal traits to this particular sample (of approx. 250). As there are two major trait dimensions – Agency/unagentic and Communality/acommunal (a.k.a. Control/submission and Affiliation/disaffiliation) – there are two additional (secondary) dimensions (or four additional vectors), arrogant/unassuming and introversion/extroversion. Normalization was conducted for each dimension, therefore the demarcations between trait vectors – dominance/ submission, arrogant/ unassuming, cold/warm, and introverted/ extraverted – are representative of this southwest public university’s demographic (sans business majors, and most likely sans engineers and computer science students). This leads to the usual sample bias of participant students – selectivity; as non-business majors, this introductory computer class from which the sample was drawn was a ‘required’ elective (students could have chosen an alternative business course); as students selected into this class, they could select out; as students selected into participating, they could select out. Usually given such a sample size, such bias issues would seem minimized. In a study such as this, however, where the sample is normalized, not on one or two dimensions but on four/eight, size matters. I felt precluded from conducting this study on a gender basis, because the divided sample pool would not generate enough subjects per octant; consequently I normalized traits by gender and regrouped the sample pool. Selectivity also affects the trait representations. For instance, did an equal number of aloof students select into the study as extroverts did? Despite such uncertainty, this research did support how gregarious/extraverts (NO) are more likely to endorse an activity, regardless of its perceived usefulness. (The gregarious/extraverts (NO) may have even still participated in the study, regardless of the incentive bonus points.) Presuming that more extraverts participated in this study than introverts, who’s representing the introverts and,

additionally, how moderate or representative are the remaining extraverts? The same could be considered of the assured versus unassured. Culturally, it may be surmised that this university's population would be above average with regards to 'surgency' and communality.

My survey methodology had weaknesses and thus introduced an internal threat in the form of a testing threat. Regrettably, after surveying the students at the first of the semester with one IPC instrument (LaForge 1977), I subsequently realized the flaws of the instrument (Acton et al. 2002). Therefore, at the end of the CBL units, I re-administered the more reliable CSIV (32 question short form) on Survey 2, along with the planned post-CBL survey questions. To minimize question response bias, I placed the CSIV at the end of the second survey. The CSIV, like any personality survey, lends itself to socially desirability bias. While the students were informed of anonymity, responding with socially desirable answers could still be evident. While students reported completing the survey in as short as five minutes, impatience can still distort responses. Potential subversion is a more curious matter. Are all those octant participants responding honestly and accurately? Given what you know now, who would you wonder about providing subversive responses?

The computer-based learning (CBL) system, while providing a purposeful, if not excellent, research task, potentially created some subject integrity issues. The positives of this research design were the following. (1) Rather than being conducted within an artificial, time-structured experiment, participants were actually purposely using the CBL system for a class. (2) The environment in which the students worked on their assignments was relatively similar for most all of the participants: the students had been strongly advised to use the system from one of two university computer centers conveniently located on campus. (Doing so minimized compatibility, connectivity, and stability problems from home computers, laptops, and bandwidth constraints.) Thus, the computer systems on which they worked was very similar, as well (Dell pc Optiplex 745; Windows XP). The limitations or integrity issues were that it was not a controlled environment and the participants, as participants in the same class, exposed the research to social interaction threats in the form of students influencing or biasing each other, during the course of the semester, regarding the CBL system (and, thus TAM-related issues: perceived enjoyment, -system performance, -ease of use, -usefulness, and behavioral intent to use).

5.7 CONTRIBUTIONS OF RESEARCH AND SUMMARY

This research advances our introduction (Brown et al. 2005; Brown et al. 2003; Brown et al. 2004; Poole et al. 2004) to the MIS field the well-established personality model, The Interpersonal Circumplex (IPC) (Carson 1969; Kiesler 1983; Kiesler 1985; Leary 1957; Locke 2000; Strong et al. 1986; Wiggins 1979). The IPC defines broad sets of personality characteristics and behaviors that have direct implications for perceptions, responses, and trust, and, as this research posits, implications for the evaluation of technology and its adoption.

Bridging the research between psychology and MIS may contribute to the areas of the technology adoption model, implementation and adoption of information technology. Davis (Davis 1989) – whose TAM model relies the user’s *perceived* usefulness and *perceived* ease of use – noted the subjectivity involved in his study: the user’s perceptions “are subjective appraisal of performance and effort, respectively, and do not necessarily reflect object reality” (p. 335). Agarwal (Arguwal et al. 1999) writing on individual differences and technology acceptance suggests that “researchers could seek to find those individual differences that are instrumental in explaining a large proportion of the variance in beliefs;” on the same matter he continues that “others could focus on examining additional laws and individual difference variables that these *laws* [italics added] might yield” (p. 384). This research seeks to address such subjective soft spots in technology acceptance model and some of the proposed extensions to the model. The well-documented and validated interpersonal circumplex model (IPC), as well as Locke’s (Locke et al. 2007) circumplex scales of interpersonal values (CSIV) do provide psychological “laws,” so to speak, about individual differences; further, these IPC delineated trait differences may explain different individual’s *subject appraisals* and the *large proportion of the variance in beliefs*. Where beauty is said to be in the eye of the beholder, perception may be in his or her personality.

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APPENDIX

FIGURES

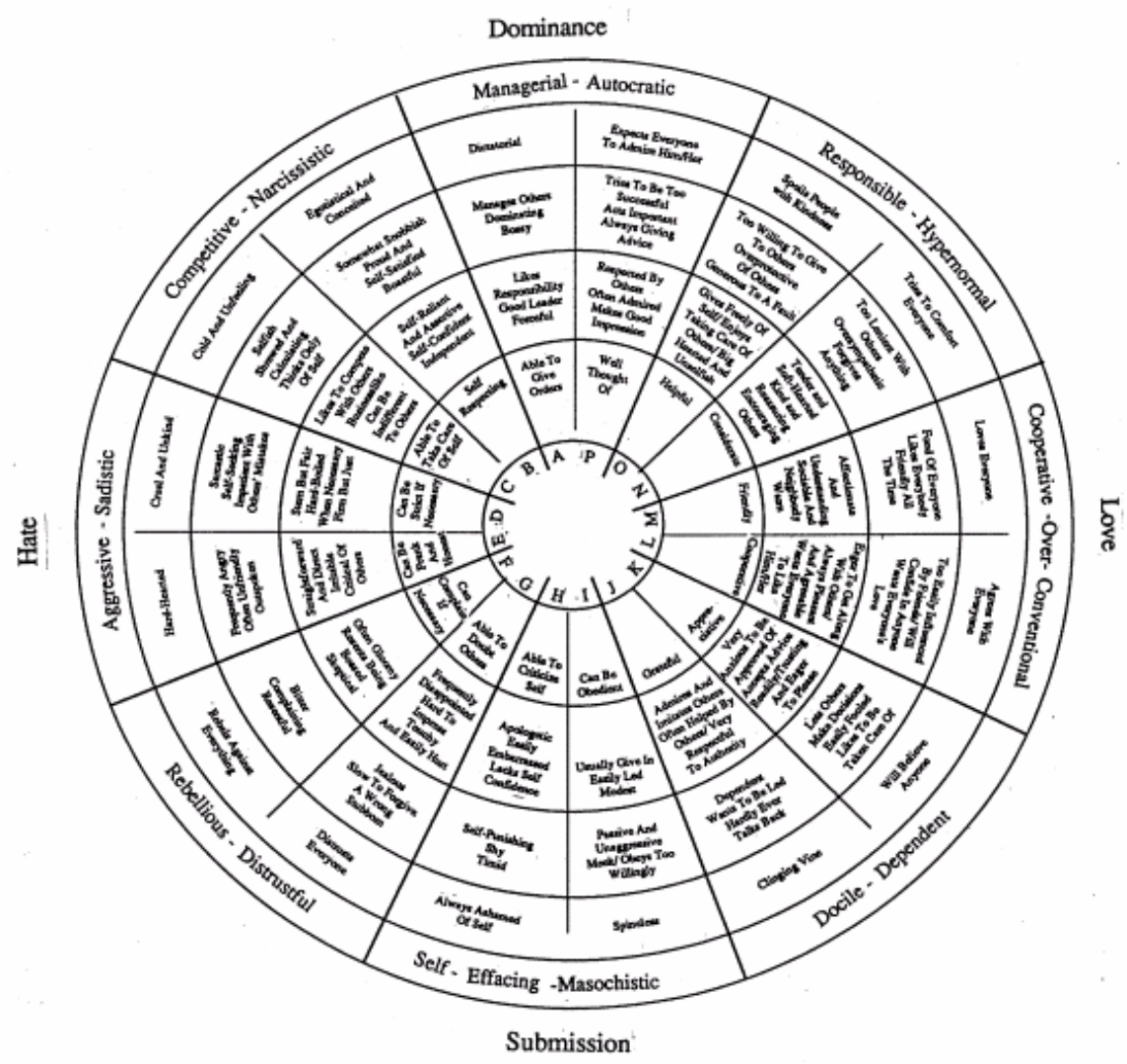


Figure A1. Leary's 1957 Interpersonal Behavior Circle. Leary's IBC reproduced with permission of the Leary Estate (Futique Trust).

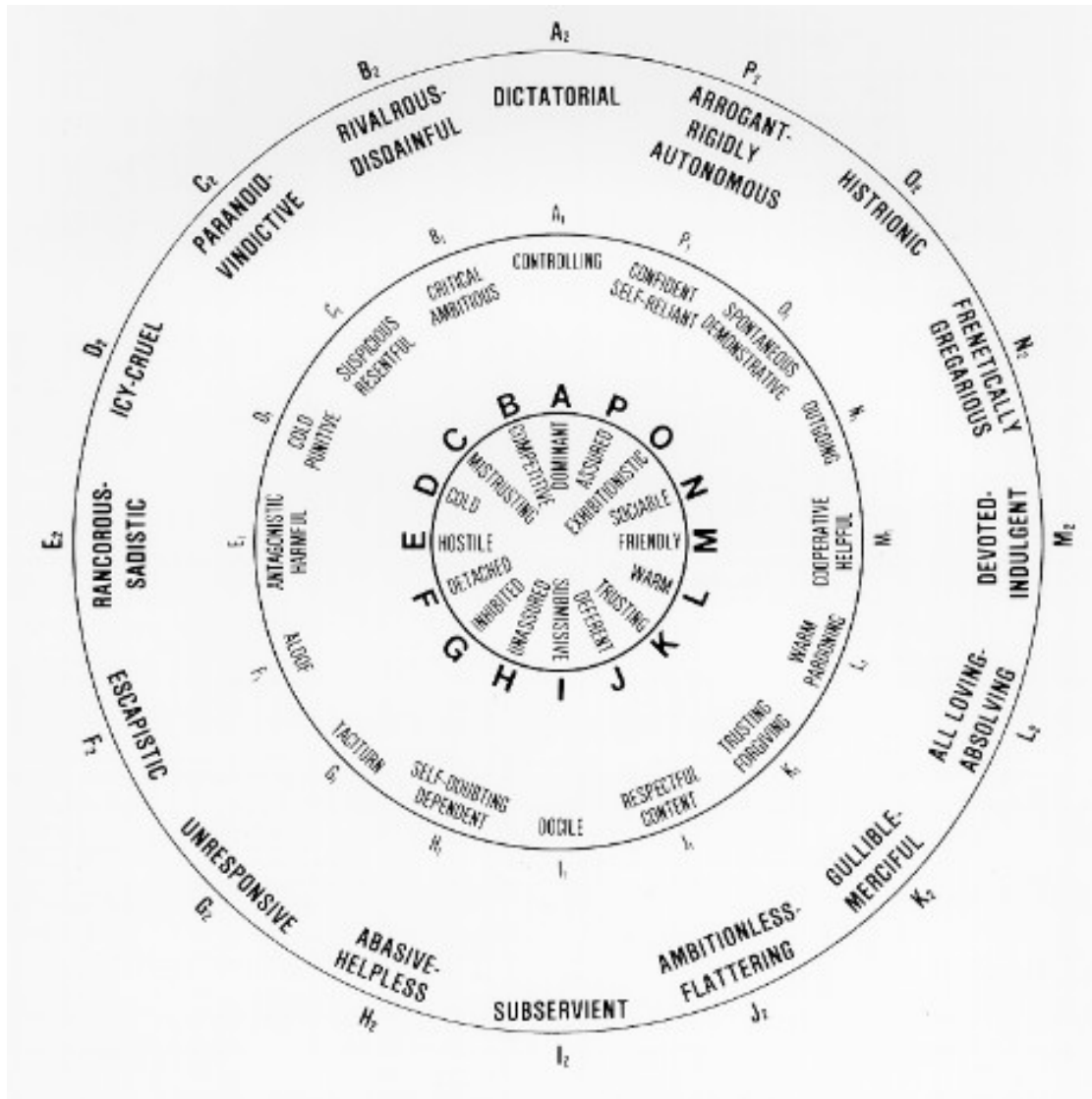


Figure A2. Kiesler's Interpersonal Circumplex with Levels.

Reprinted with permission from "The 1982 interpersonal circle: A taxonomy for complementarity in human transactions" by Kiesler, D.J., 1983, *Psychological Review* 90(3): 185-214, Copyright (1993) American Psychological Association.

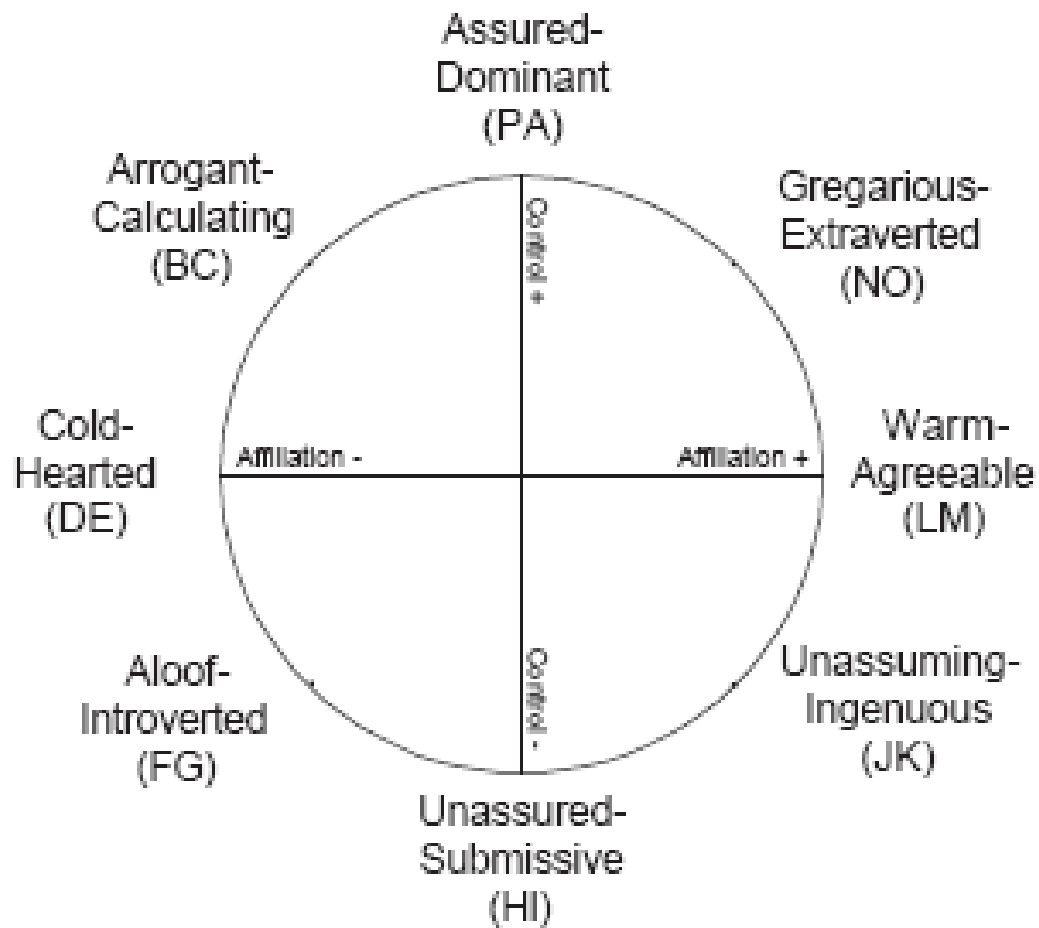


Figure A3. Wiggin's Revised Interpersonal Circumplex (Revised from 16 octants to 8)

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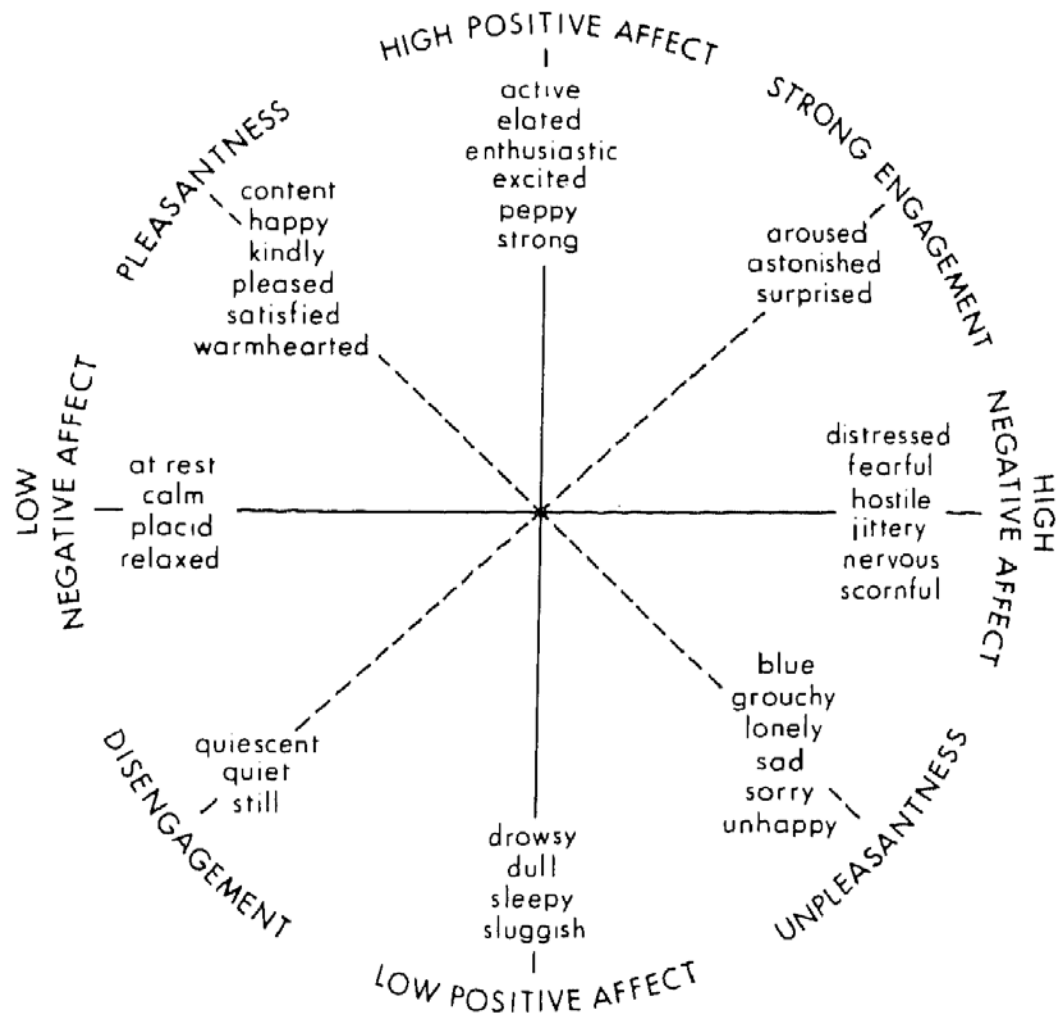


Figure A4. Tellegen's Two Factor Structure of Affect

Tellegen, A. "Structures of mood and personality and their relevance to assessing anxiety, with an emphasis on self-report," in: *Anxiety and the Anxiety Disorders*, A.H. Tuma and J.D. Masers (eds.), Erlbaum, Hillsdale, NJ, 1985.

Tables

Table A1. Participant Distributions – Quadrants and Octants

Observed (N)		Expected	Residual
(16) PA Assured/Dominant	(17) HI Unassured/Submissive	16.5	0.5
(31) BC Arrogant/Calculating	(26) JK Unassuming/Ingenuous	28.5	2.5
(59) DE Cold/Hostile	(44) LM Warm/friendly	51.5	6.5
(24) FG Aloof/Introverted	(27) NO Gregarious/Extraverted	25.5	1.5
		Total	Females Males
Hemisphere	Acommunal	127	55 72
Hemisphere	Communal	118	57 61
Quadrant I	Hostile-Dominant	59	25 34
Quadrant II	Hostile-Submissive	68	30 38
Quadrant III	Friendly-Submissive	62	29 33
Quadrant IV	Friendly-Dominant	56	28 28
Octant PA	Assured-Dominant	16	08 08
Octant BC	Arrogant-Calculating	31	16 18
Octant DE	Cold-Hostile	59	28 31
Octant FG	Aloof-Introverted	24	07 17
Octant HI	Unassured-Submissive	17	06 11
Octant JK	Unassuming-Ingenuous	27	12 15
Octant LM	Warm-Agreeable/Friendly	44	24 20
Octant NO	Gregarious-Extraverted	27	14 13

Table A2. Participant Distributions – Response Rates

Introductory Computer Information Class – for Non-Business Majors

Class size initially 400 / reduced to 338		Response Rate 1 Survey 1	Response Rate Survey 2
Initial Participation in Survey 1	274 Total	68.5% / 81.1 %	
Females	131		
Males	143		
Participation in Survey 2	279 Total	82.5%	
Females	125		
Males	154		
Usable Surveys	245	72.5%	
Females	112 of 125		
Males	113 of 154		

Table A3. Table of Reliabilities

	CSE	CA-sp	PE	PSP	TI-gn	TI-fa	PEU	PU	BI
# of Items	10	4	3	4	5	6	5	5	3
Cronbach	0.846	0.851	0.924	0.779	0.930	0.936	0.953	0.943	0.888
p-value	<.000	<.000	<.000	<.000	0.181	<.000	.0001	<.000	<.000

Table A4 Reliability Coefficients (for CSE-G, CARS-g, CARS-sp, CAS-sp, PSP, PE, TI-GN, PEU, PU, BI-sp, BI-g)

Measuring Instrument		Cronbach's alpha coefficient	
		Current	Previous Studies
CSE	Computer Self-efficacy Scale – General	0.892	0.91 – 0.95
CARS-g	Computer Anxiety Rating Scale – General	0.853	0.87 – 0.94
CARS-sp	CARS specific to CBL system (<i>SimNet</i>)	0.885	
PSP	Perceived System Performance	0.792	0.77 +
PE	Perceived Enjoyment	0.923	0.81 – 0.90+
TI-GN	Trusting Intention – (GN)	0.935	0.92 +
TI-FA	Trusting Intention – (FA)	0.941	0.92 +
PEU	Perceived Ease of Use	0.952	0.90 +
PU	Perceived Usefulness	0.945	0.92 – 0.94
BI – sp	Behavioral Intention to Use (<i>SimNet</i>)	0.859	

Table A5. Correlation Matrix of the Variables

	Dom	Aff	CSE	CA-g	CA-sp	PE	PSP	TI	PEU	PU	BI – sp	BI - other
Agency (Dominance)	1											
Communal (Affiliation)	-.125	1										
CSE	-.056	.053	1									
CA – general	-.116	-.019	-.130	1								
CA – specific	.038	-.044	-.010	.248**	1							
PE	-.045	-.015	.061	-.078	.069	1						
PSP	-.018	.145*	.071	-.002	-.196**	.293**	1					
TI (fa)	.113	.017	.122	-.145*	-.141*	.563**	.422**	1				
PEU	-.001	-.125	-.037	.143	.156*	-.210**	-.186**	-.242**	1			
PU	-.114	.131*	-.152*	.123	-.015	-.375**	-.169**	-.521**	.304**	1		
BI – specific	.066	-.111	.191**	-.119	.023	.530**	.347**	.630**	-.157*	-.496**	1	
BI - other	.093	-.088	.189**	-.188**	.025	.404**	.267**	.577**	-.091	-.372**	.729**	1

* Correlation is significant at the 0.05 level (2-tailed)

** Correlation is significant at the 0.01 level (2-tailed)

Table A6. Raw and Normalized Mean and Standard Deviations for Agency and Communal (total, males, females)

	Raw (M&F) Mean	Std. Dev.	Male	Std. Dev.	Female	Std. Dev.		Norm- alized Mean	Std Dev	Male	Std. Dev.	Female	Std. Dev.
Agency (Dominance)	2.08	0.65	2.10	0.668	2.05	0.639		0.000247	1.121	-0.00353	1.267	0.0047	1.1468
Communal (Affiliation)	2.61	2.04	2.15	0.970	3.16	2.083		0.001219	2.04	0.00161	1.952	0.0007	2.1485

Table A7. Computer Anxiety – General
Computer Anxiety – Specific

Descriptives

		N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
						Lower Bound	Upper Bound		
AVE CA	1	11	2.29545	.940865	.283682	1.66337	2.92754	1.000	4.250
	2	26	2.63462	1.129670	.221546	2.17833	3.09090	1.000	5.000
	3	51	2.69608	1.358596	.190242	2.31397	3.07819	.000	6.000
	4	22	2.56818	.991577	.211405	2.12854	3.00782	1.000	4.500
	5	15	2.83333	1.478013	.381621	2.01484	3.65183	1.000	5.000
	6	23	2.85870	1.518496	.316628	2.20205	3.51534	1.000	6.000
	7	39	2.64103	1.350919	.216320	2.20311	3.07894	1.000	5.500
	8	22	2.44318	1.180022	.251581	1.91999	2.96637	1.000	4.750
	Total	209	2.64474	1.274159	.088135	2.47098	2.81849	.000	6.000
CAS_AVE	1	16	2.54688	1.100071	.275018	1.96069	3.13306	1.000	4.000
	2	31	2.72581	1.035525	.185986	2.34597	3.10564	1.000	4.500
	3	59	3.01695	1.064579	.138596	2.73952	3.29438	1.000	5.250
	4	24	2.93750	1.086603	.221802	2.47867	3.39633	1.500	6.000
	5	17	2.47059	1.277456	.309829	1.81378	3.12740	1.000	5.250
	6	27	2.97222	1.144244	.220210	2.51957	3.42487	1.000	5.500
	7	44	2.41477	1.197069	.180465	2.05083	2.77871	1.000	5.000
	8	27	3.41667	1.491966	.287129	2.82646	4.00687	1.000	6.000
	Total	245	2.83469	1.191552	.076125	2.68475	2.98464	1.000	6.000

Table A8. Means and Variances of Major Variables Used in the Study

Variable	Mean	Variance
CSE	4.512	.527
CARS –g	2.645	.225
CARS –sp	2.835	.111
PSP	3.664	.165
PE	2.83	.071
TI –GN	3.553	.003
TI –FA	3.687	.009
PEU	2.512	.009
PU	3.287	.018
BI –sp	2.967	.184

Table A9. Summary of the Results of the Research Hypotheses

No.	Hypothesis	Result
1a	The participants' level of communality will be negatively correlated to computer self-efficacy (CSE).	Not Supported
1b	Octant aloof/introverted (FG) and octant cold/hostile (DE) will report higher average computer self-efficacy than octants gregarious-extroverted (NO) and unassuming/ingenuous (JK).	Not Supported
2a	The participants' level of communality will be positively correlated to computer anxiety .	Not Supported
2b	IPC octant aloof/introverted (FG) and octant assured/dominant (PA) will report lower average computer anxiety – general than octants Gregarious-Extraverted (NO) and unassuming/ingenuous (JK).	Not Supported
3a	The participants' level of communality will be positively correlated to computer anxiety .	Not Supported
3b	IPC octant aloof/introverted (FG) and octant assured/dominant (PA) will report lower average computer anxiety-specific than octants Gregarious-Extraverted (NO) and unassuming/ingenuous (JK).	Somewhat Supported
4a	The participants' level of communality will be positively related to their reported level of perceived enjoyment .	Not Supported
4b	IPC octant gregarious/extraverted (NO) and octant warm/friendly (LM) will report higher average enjoyment using the CBL system than octants aloof/introverted (FG) and cold/hostile (DE).	Not Supported
5a	The participants' level of communality will be positively related to their reported level of perceived system performance .	Somewhat Supported
5b	IPC octant warm/friendly (LM) and octant gregarious/introverted (NO) will report higher average perceived system performance of the CBL reliability than octants cold/hostile (DE) and aloof/introverted (FG).	Not Supported

Table A9. Summary of the Results of Research Hypotheses - continued

6a	The participants' level of communality will be positively related to their reported level of trusting intentions .	Not Supported
6b	IPC octant unassuming/ingenuous (JK) and octant warm/friendly (LM) will report higher average trusting intention to use the CBL system in the future than octants arrogant/calculating (BC) and cold/hostile (DE).	Not Supported
7a	The participants' level of communality will be negatively related to their reported level of perceived ease of use .	Not Supported
7b	Octant aloof/introverted (FG) and octant cold/hostile (DE) will report higher average perceived ease of use than octants gregarious/extroverted (NO) and warm/friendly (LM).	Not Supported ⁴³
8a	The participants' level of communality will be positively related to their reported level of perceived usefulness of the CBL system.	Supported
8b	Octant gregarious-extroverted (NO) will report the higher average perceived usefulness than octants unassured/submissive (HI) and aloof/introverted (FG).	Not Supported
9a	The participants' level of communality will be negatively related to their reported level of behavioral intention to use the CBL system in the future.	Not Supported
9b	IPC octant aloof/introverted (FG) and octant gregarious/extraverted (NO) will report higher average behavioral intention than octant unassured/submissive (HI).	Supported

⁴³ H7b_PEU: Independently, however, cold/hostile (DE) decoupled from aloof/introverted (FG) reported significantly higher average PEU ($\alpha < 0.10$) than octants gregarious/extraverted (NO) and warm/friendly (LM).

ILLUSTRATIONS

Illustration 1. Computer Self-Efficacy (CSE) on the Quadrant Level

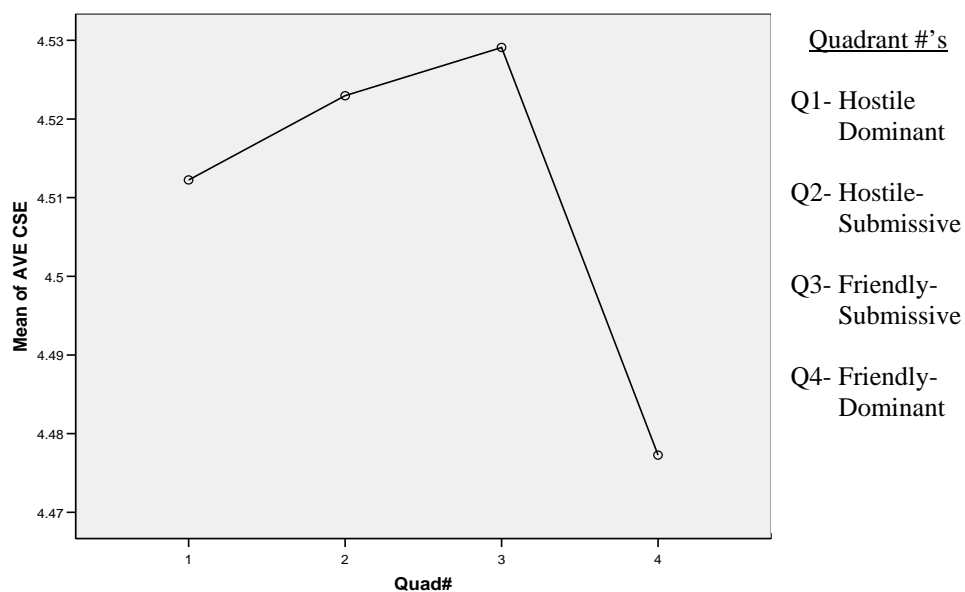


Illustration 2. Computer Self-Efficacy (CSE) on the Octant Level

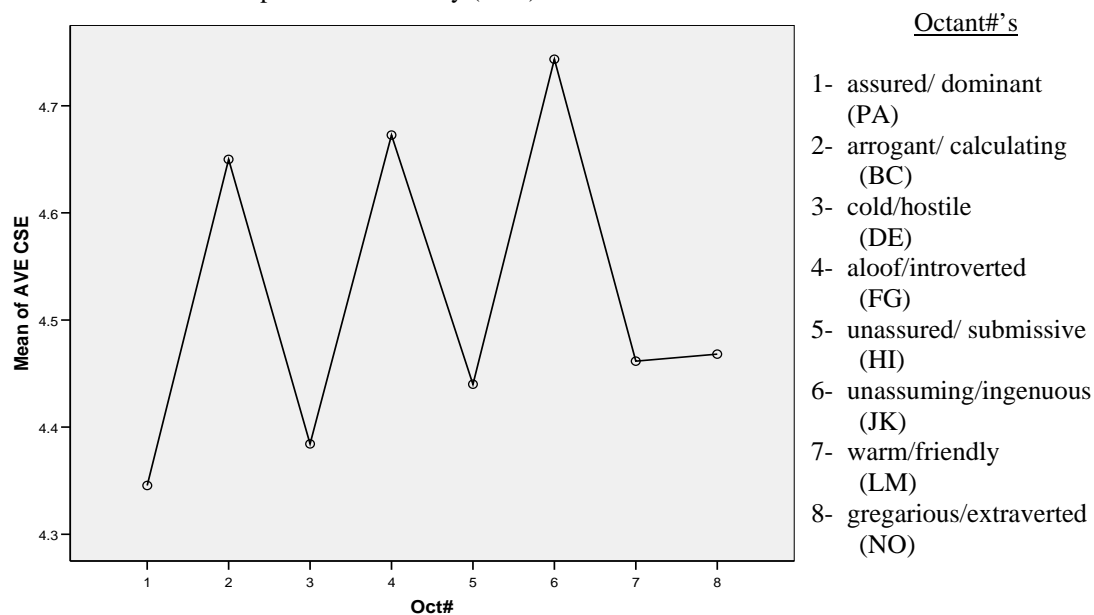


Illustration 3 Computer Anxiety – General (CA-g) on the Quadrant Level

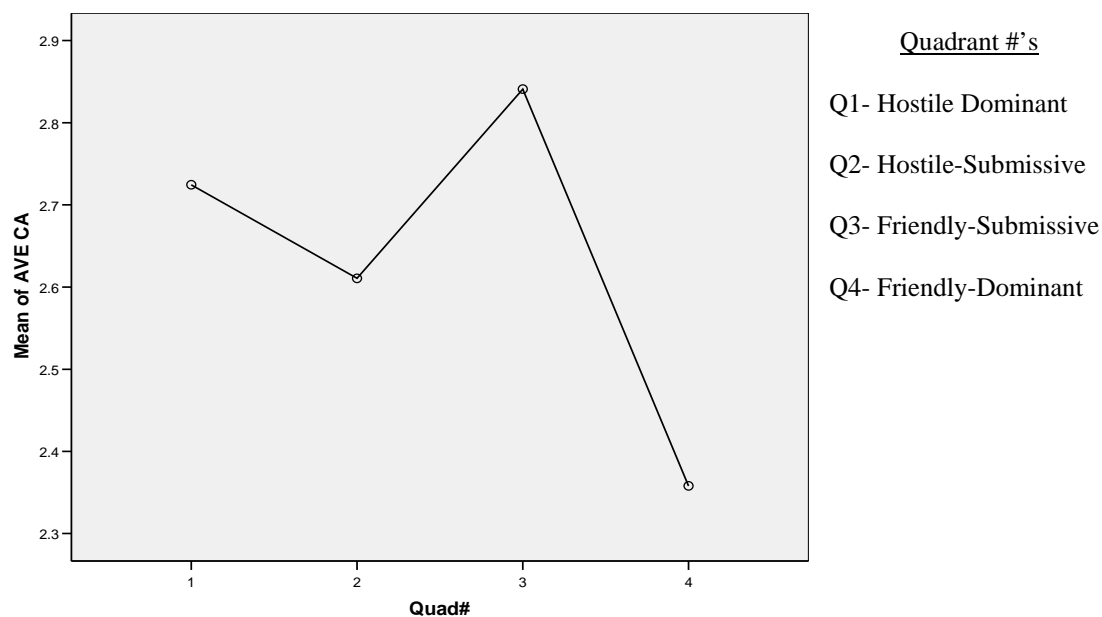


Illustration 4 Computer Anxiety – General (CA-g) on the Octant Level

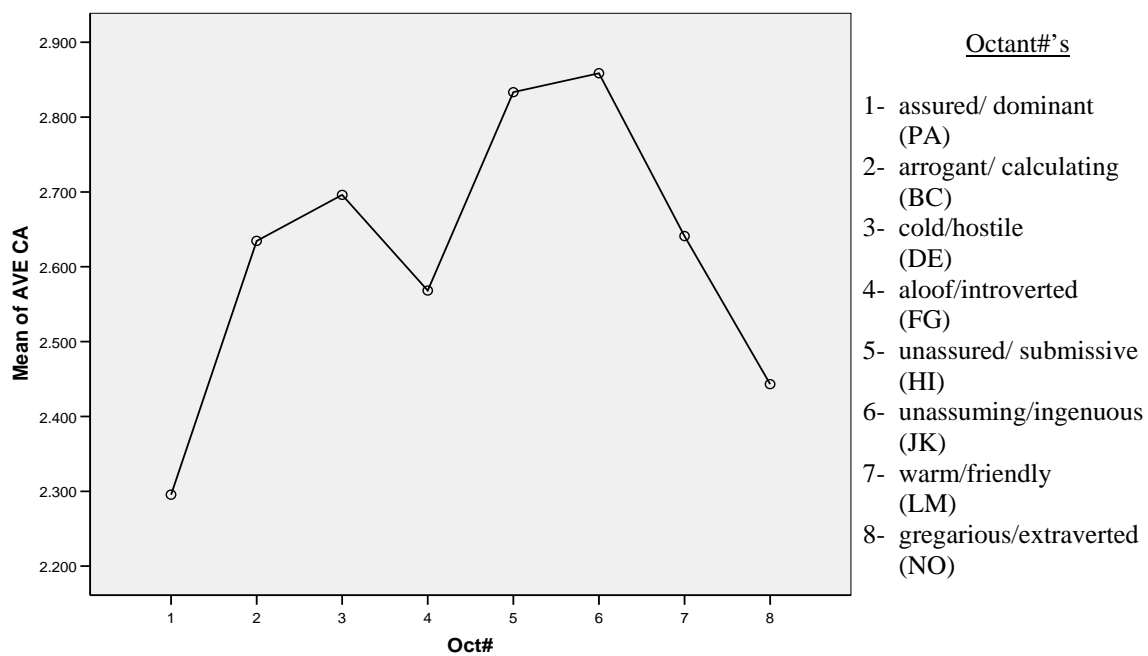


Illustration 5. Computer Anxiety-specific to CBL (CA-sp) on the Quadrant Level

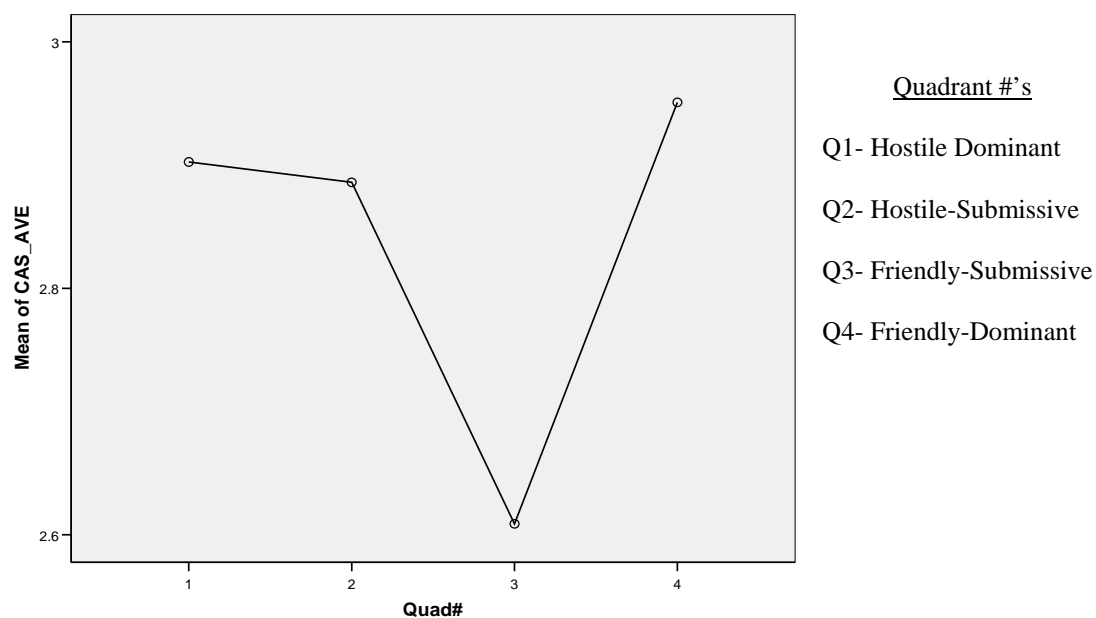


Illustration 6. Computer Anxiety-specific to CBL (CA-sp) on the Octant Level

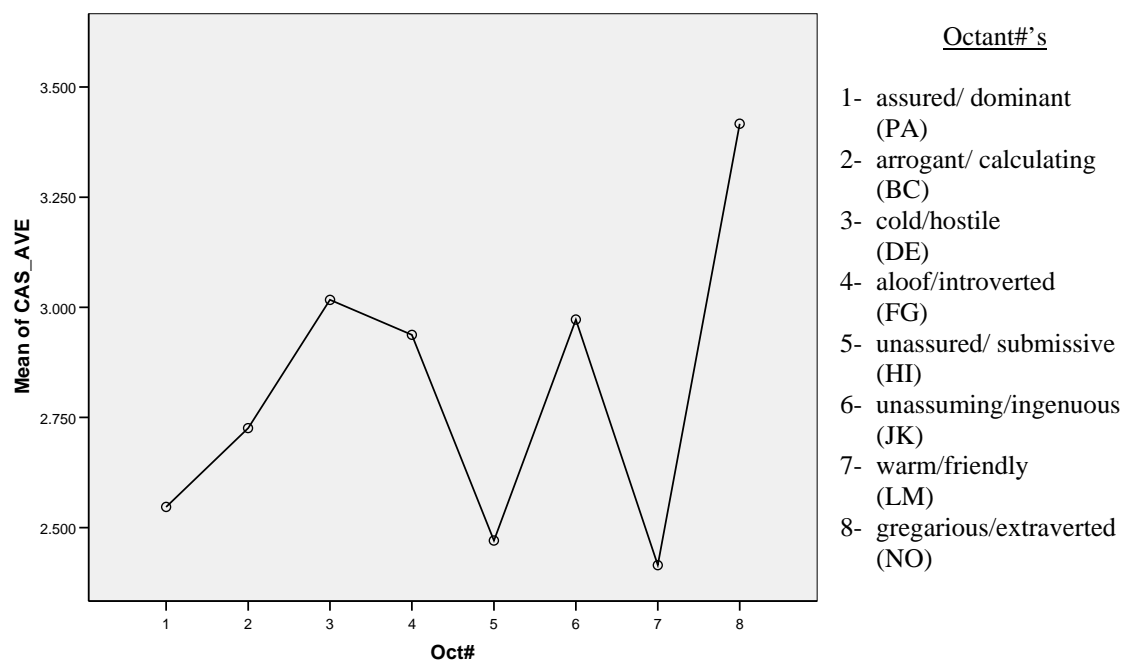


Illustration 7. Perceived Enjoyment (PE) on the Quadrant Level

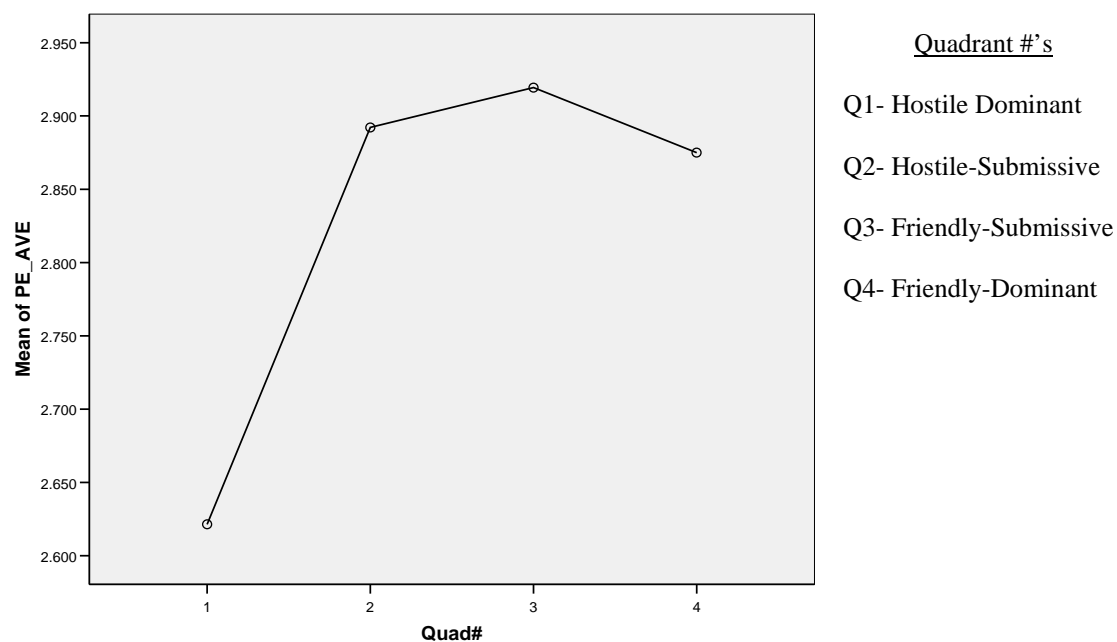


Illustration 8. Perceived Enjoyment (PE) on the Octant Level

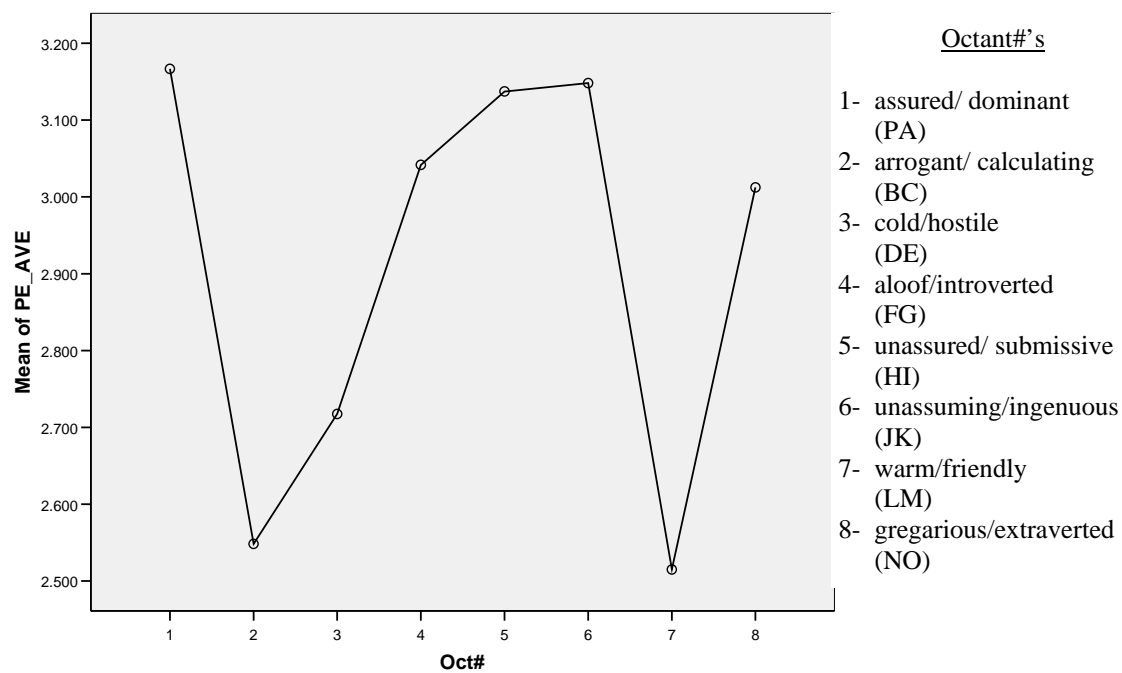


Illustration 9. Perceived System Performance (PSP) on the Quadrant Level

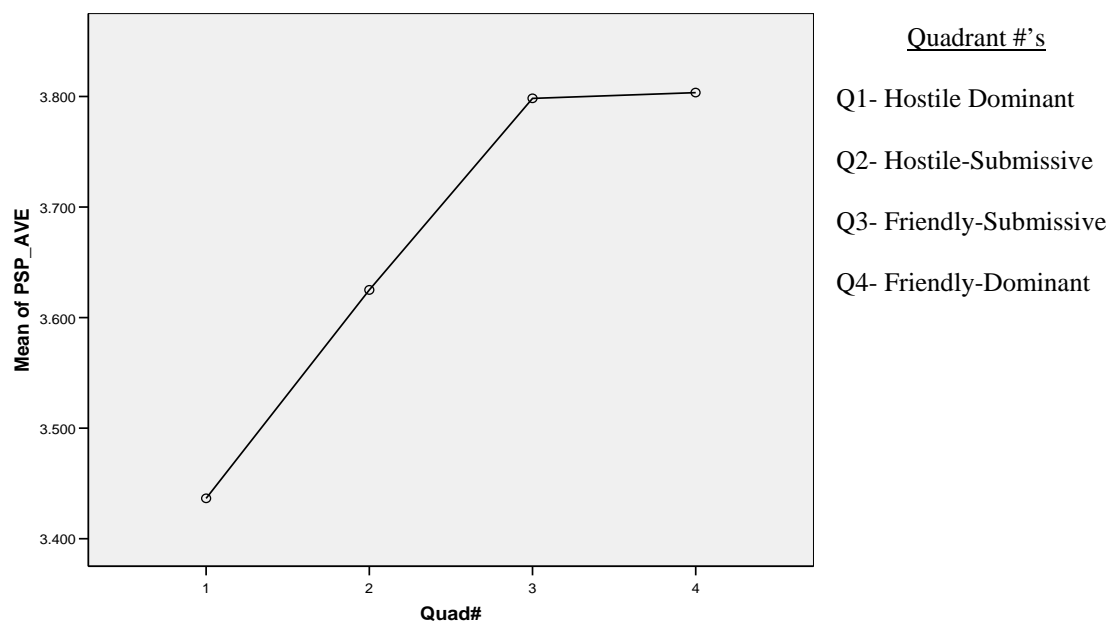


Illustration 10. Perceived System Performance (PSP) on the Octant Level

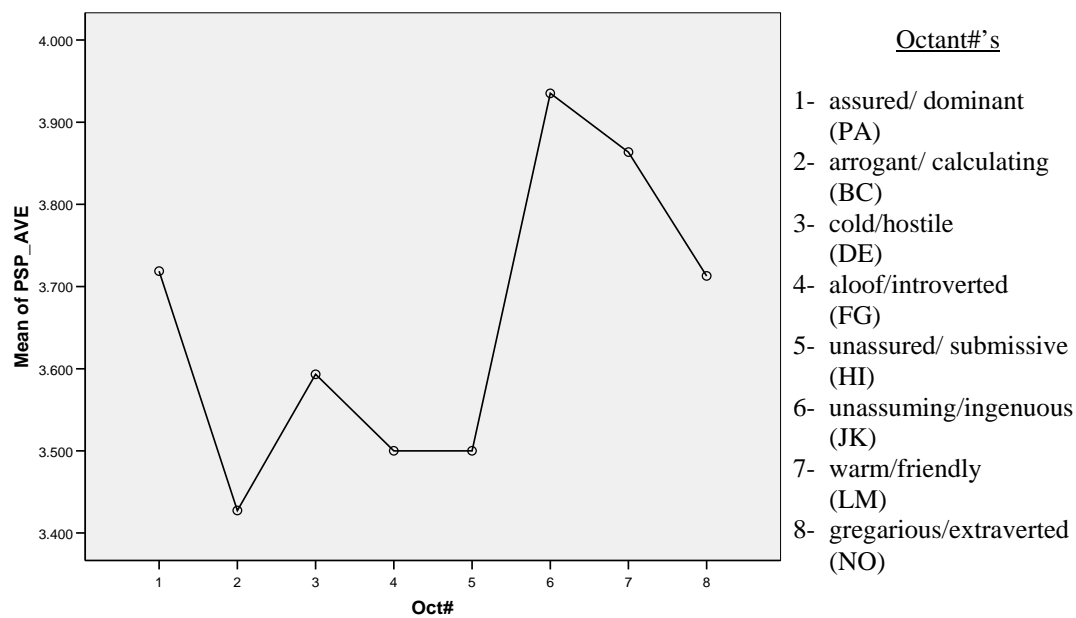


Illustration 11. Perceived Ease of Use (PEU) on the Quadrant Level

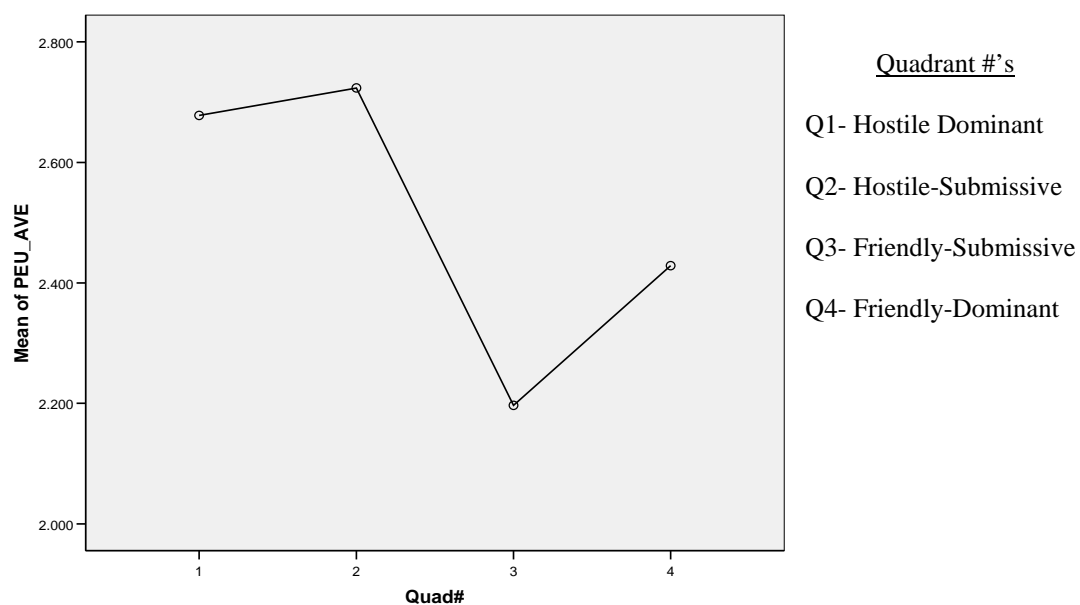


Illustration 12. Perceived Ease of Use (PEU) on the Octant Level

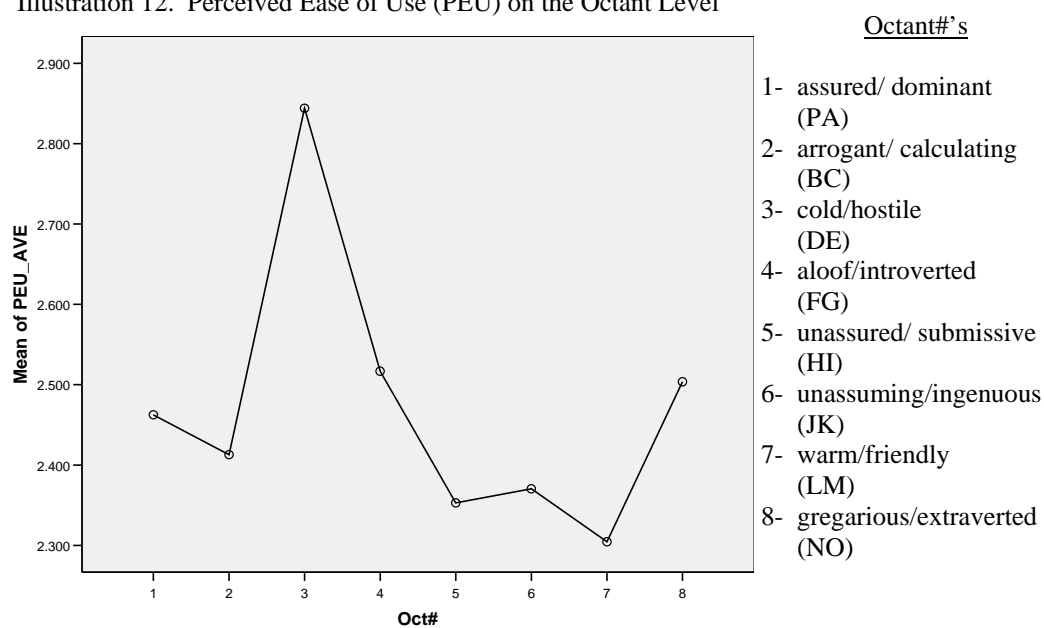


Illustration 13. Perceived Usefulness (PU) on the Quadrant level

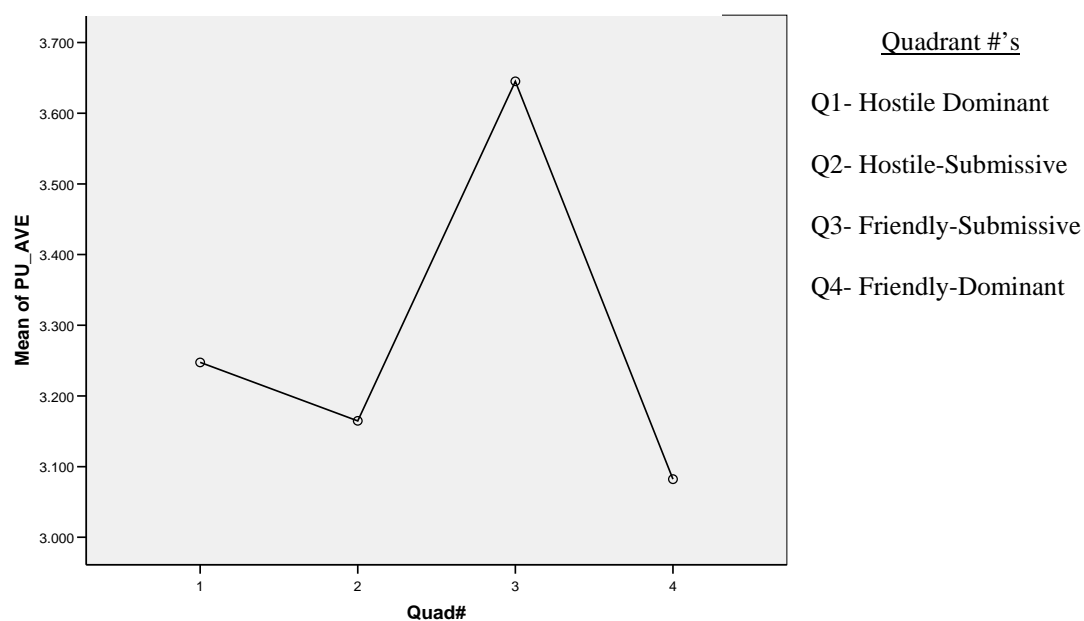


Illustration 14. Perceived Usefulness (PU) on the Octant Level

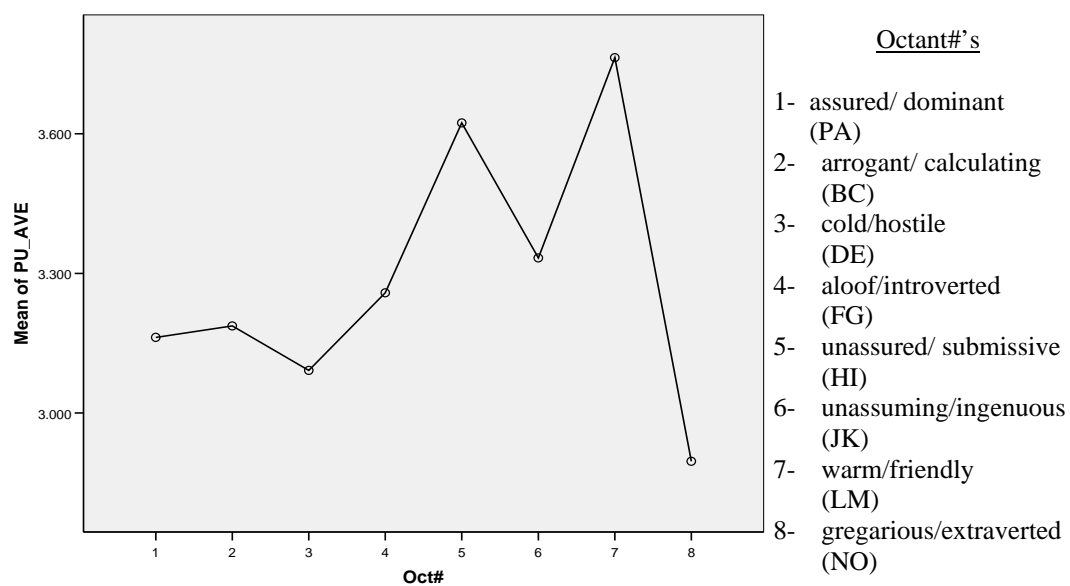


Illustration 15. Behavioral Intention (BI-sp) to use this CBL on the Quadrant Level

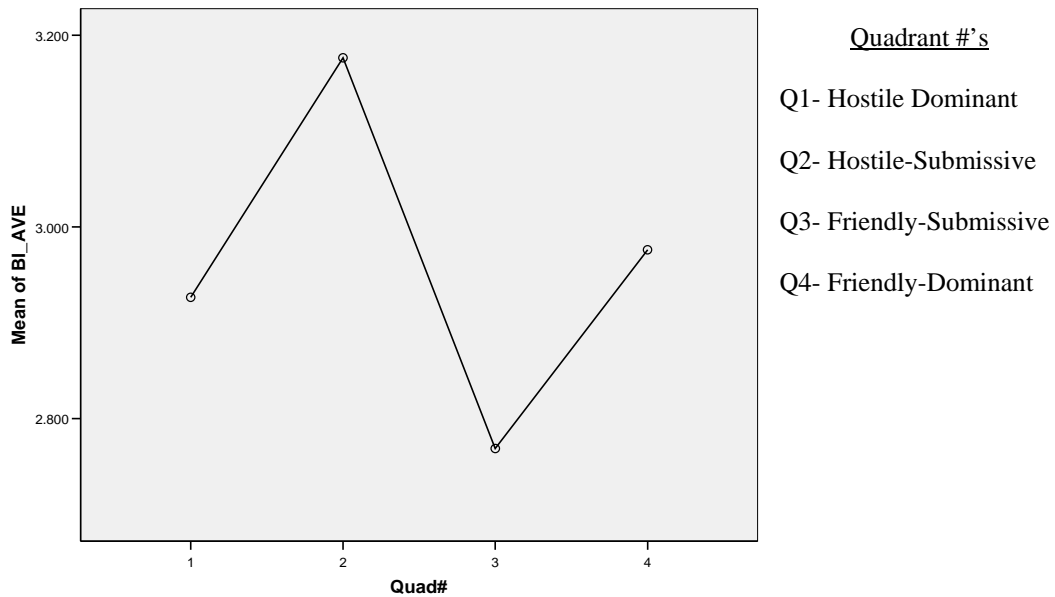


Illustration 16. Behavioral Intention (BI-sp) to use this CBL on the Octant Level

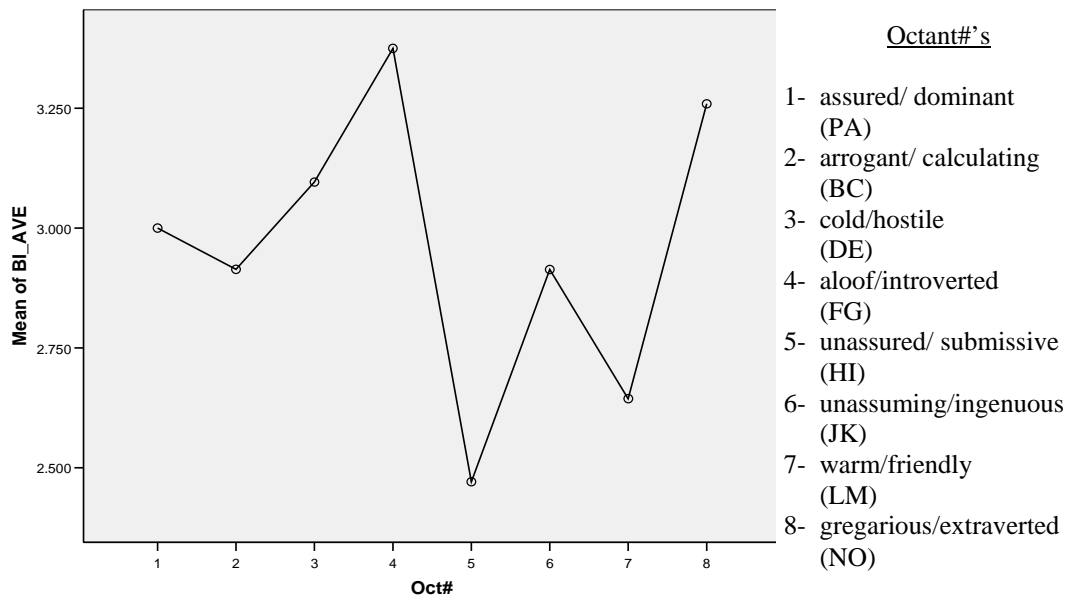


Illustration 17. Trusting Intention (fa) on the Quadrant Level

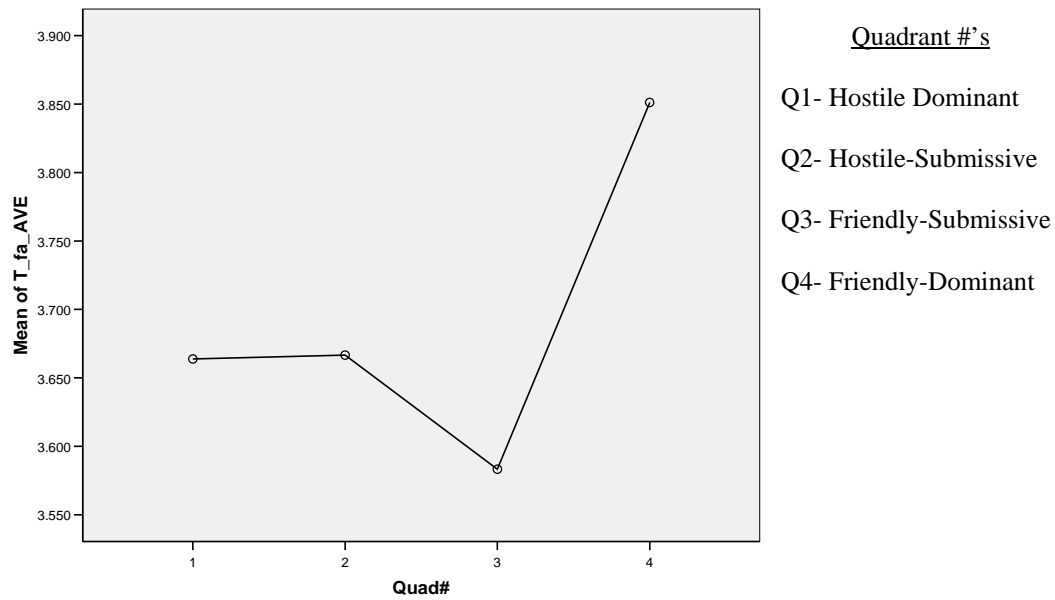
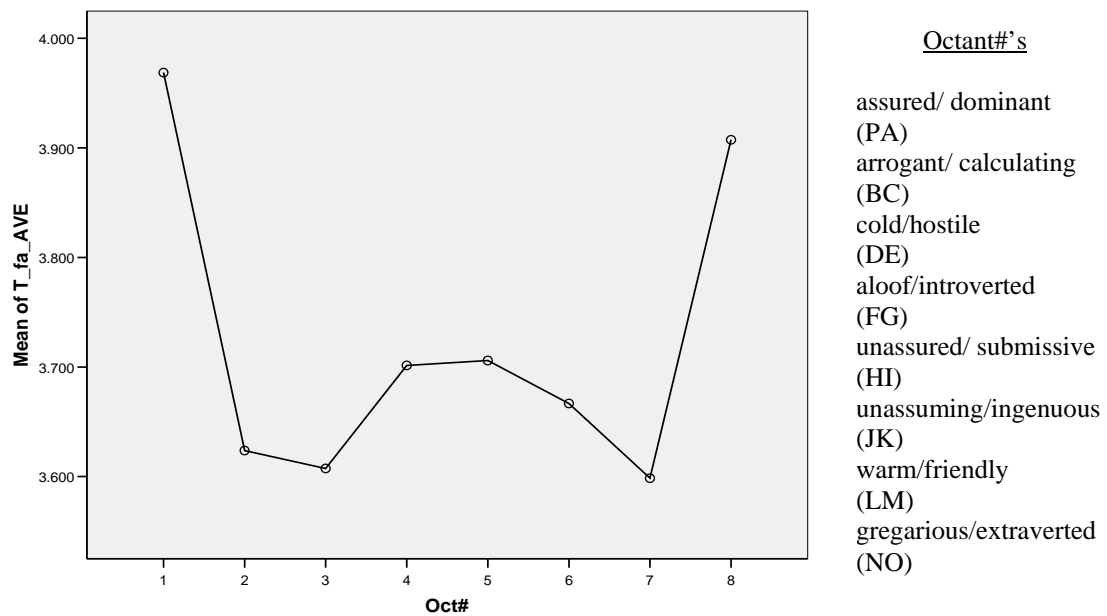


Illustration 18. Trusting Intention (fa) on the Octant Level



M (option 2a) (CSIV_32 questions, Locke)

For each item below, answer the following question: "When I am in interpersonal situations (such as with close friends, with strangers, at work, at social gatherings, and so on), in general how important is it to me that I act or appear or am treated this way?" Use the following rating scale:

0	1	2	3	4
not	mildly	moderately	very	extremely
important to me	important to me	important to me	important to me	important to me

Sample Item:

When I am with him/her/them, it is... 0 1 2 3 4 ...that I be well dressed

If when you are with others you generally consider it extremely important that you be well-dressed, you would circle 4. If it is not important that you be well dressed, you would circle 0. If you consider it moderately important that you be well-dressed, you would circle 2.

1. When I am with him/her/them, it is... 0 1 2 3 4 ...that I appear confident
2. When I am with him/her/them, it is... 0 1 2 3 4 ...that I not expose myself to
ridicule
3. When I am with him/her/them, it is... 0 1 2 3 4 ...that I feel connected to them
4. When I am with him/her/them, it is... 0 1 2 3 4 ...that I appear forceful
5. When I am with him/her/them, it is... 0 1 2 3 4 ...that I live up to their
expectations
6. When I am with him/her/them, it is... 0 1 2 3 4 ...that I express myself openly
7. When I am with him/her/them, it is... 0 1 2 3 4 ...that I keep my guard up
8. When I am with him/her/them, it is... 0 1 2 3 4 ...that I get along with them
9. When I am with him/her/them, it is... 0 1 2 3 4 ...that they acknowledge when I
am right
10. When I am with him/her/them, it is... 0 1 2 3 4 ...that I appear aloof
11. When I am with him/her/them, it is... 0 1 2 3 4 ...that they support me when I
am having problems
12. When I am with him/her/them, it is... 0 1 2 3 4 ...that I keep the upper hand
13. When I am with him/her/them, it is... 0 1 2 3 4 ...that I do what they want me
to do
14. When I am with him/her/them, it is... 0 1 2 3 4 ...that they respect what I have
to say

15. When I am with him/her/them, it is... 0 1 2 3 4 ...that they keep their distance from me
16. When I am with him/her/them, it is... 0 1 2 3 4 ...that I make them feel happy
17. When I am with him/her/them, it is... 0 1 2 3 4 ...that I not back down when disagreements arise
18. When I am with him/her/them, it is... 0 1 2 3 4 ...that I not make mistakes in front of them
19. When I am with him/her/them, it is... 0 1 2 3 4 ...that they come to me with their problems
20. When I am with him/her/them, it is... 0 1 2 3 4 ...that I am the one in charge
21. When I am with him/her/them, it is... 0 1 2 3 4 ...that I go along with what they want to do
22. When I am with him/her/them, it is... 0 1 2 3 4 ...that I have an impact on them
23. When I am with him/her/them, it is... 0 1 2 3 4 ...that I do better than them
24. When I am with him/her/them, it is... 0 1 2 3 4 ...that they approve of me
25. When I am with him/her/them, it is... 0 1 2 3 4 ...that they not tell me what to do
26. When I am with him/her/them, it is... 0 1 2 3 4 ...that I not say something stupid
27. When I am with him/her/them, it is... 0 1 2 3 4 ...that they show concern for how I am feeling
28. When I am with him/her/them, it is... 0 1 2 3 4 ...that they mind their own business
29. When I am with him/her/them, it is... 0 1 2 3 4 ...that I not make them angry
30. When I am with him/her/them, it is... 0 1 2 3 4 ...that they listen to what I have to say
31. When I am with him/her/them, it is... 0 1 2 3 4 ...that they not know what I am thinking or feeling
32. When I am with him/her/them, it is... 0 1 2 3 4 ...that they not get their feelings hurt

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Brown, H.G., Forducey, P., Moorad, A., Deng, L., Poole, M.S., & Smeltzer, S. (2005), "Towards a sociability theory of computer anxiety: A circumplex perspective", In J. Ralph H. Sprague (Ed.), *Proceedings of the Thirty-eighth Hawaii International Conference on System Sciences*, Los Alamitos, CA, IEEE Computer Society.

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Brown, H.G., Poole, M.S., Rodgers, T.L., & Van Walsum, K. (2003), "Trust, trait theory, and collaboration in telemedicine: A circumplex perspective", In J. Ralph H. Sprague (Ed.), *Proceedings of the Thirty-sixth Hawaii International Conference on System Sciences*, Los Alamitos, CA, IEEE Computer Society.